WIN A CBM-128: NAME YOUR TOP-10 GAMES

YOUR COMPUTER

Denmark	DKr.	36.00
France	Fr.	52.50
Germany	DM.	9.50
Greece	Dra.	310.00
Holland	DFl	8.90
Italy	L	4300
New Zealand	NZ$	3.70
Singapore	M$	7.20
Spain	Pts.	400.00
Switzerland	SFr.	7.50

£1

AUGUST 1985 BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE Vol. 5 No. 8



FIST FIRST. . .

Now we rip the wraps off Melbourne's next smash hits

Spectrum Chordata and Hatch Fill

BBC Charlie Chan and Amstrad Fruity

Plus Spectrum Birdy and CBM-64 Impulse

JOYSTICK SPECIAL TOP BUYS + 50 STICKS TO BE WON



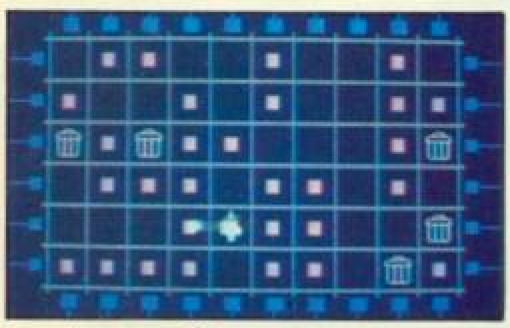
EPYX goes GOLD
64 DISK £14·95 CASSETTE £9·95
DON'T BE SCARED... IT'S NOT DIFFICULT... JUST...
IMPOSSIBLE MISSION
All the critics agree . . . Impossible Mission has a unique place amongst today's software classics. Superb graphics, synthesized voice and original game concept will keep you coming back for more. Already voted "Game of the Year" by British Micro Awards 1985, it is surely destined to become an all time great. Are YOU ready to face the most impossible mission yet devised???
"Outstanding graphics, sound and amazing digitized speech". ZZAP! 64
PITSTOP II
Head to Head racing · Superb Animation · 6 different Circuits · On-Screen Map · Full Pit Facilities!
"Pitstop II is a stunning and innovative arcade game and should prove to set new standards in the race game . . . The best race game yet." ZZAP! 64
"The graphics are excellent and the sound is great—lots of roaring engine sounds—best of all, though, Pitstop II is great fun to play . . . A Star Game." Computer & Video Games —May 1985
BREAKDANCE
Now anyone can breakdance! Popping, punking, stretching and breaking—Epyx makes it easy—but not too easy!
SCORE
Epyx products are available at good computer stores and selected branches of JOHN MENZIES · BOOTS · W.H. SMITH
U.S. GOLD All American Software
EPYX™ COMPUTER SOFTWARE
U.S. Gold Limited, Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B1 3HS. Tel: 021-359 8881.

YOUR COMPUTER Contents

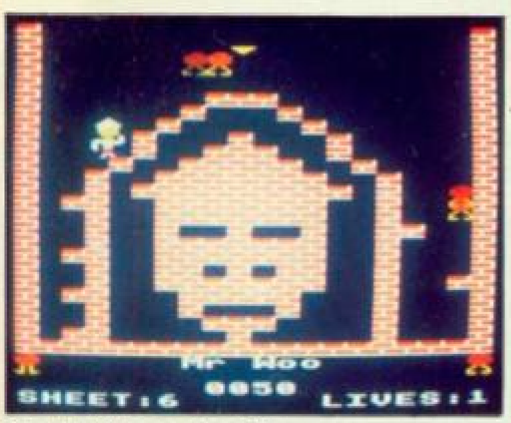
AUGUST 1985



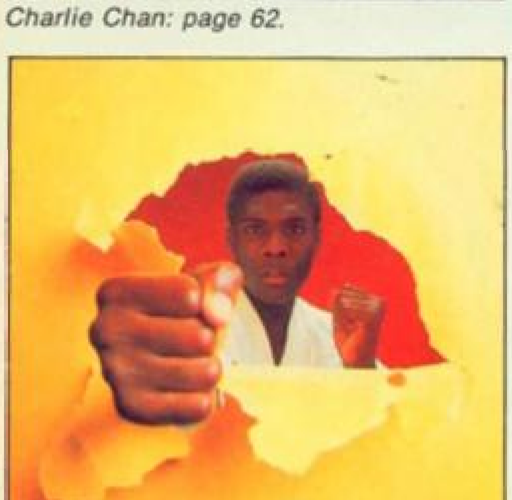
News: page 12.



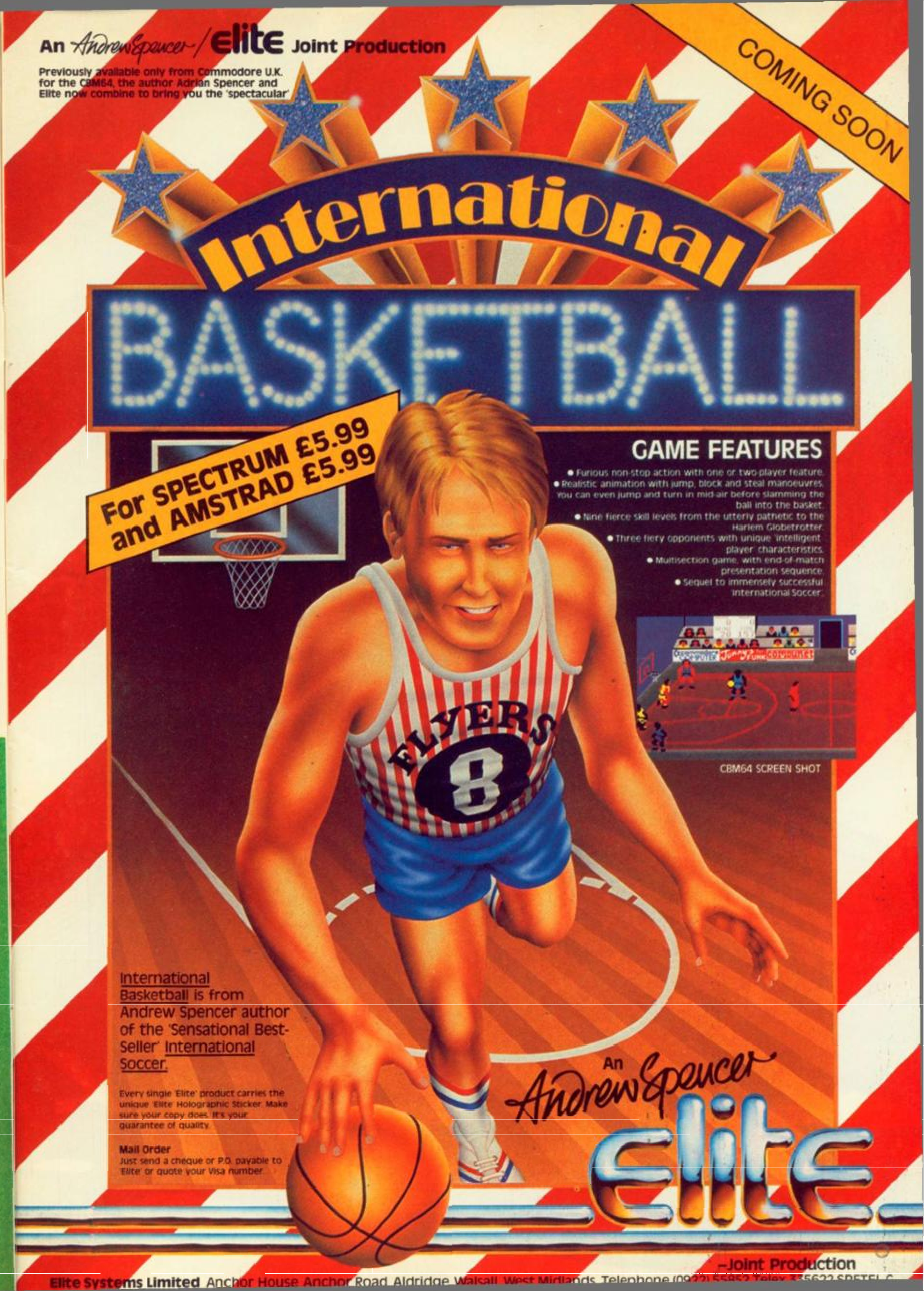
Impulse: page 58.



Charlie Chan: page 62.



Cover shot: Jeoff Thompson, karate world champion. See First Fist Then . . ., page 40.


An Andrew Spencer / elite Joint Production
Previously available only from Commodore U.K. for the CBM64, the author Adrian Spencer and Elite now combine to bring you the 'spectacular'
COMING SOON
International
BASKETBALL
For SPECTRUM £5.99
and AMSTRAD £5.99
GAME FEATURES
• Furious non-stop action with one or two-player feature.
• Realistic animation with jump, block and steal manoeuvres. You can even jump and turn in mid-air before slamming the ball into the basket.
• Nine fierce skill levels from the utterly pathetic to the Harlem Globetrotter.
• Three fiery opponents with unique 'intelligent' player characteristics.
• Multisection game, with end-of-match presentation sequence.
• Sequel to immensely successful 'International Soccer'.
CBM64 SCREEN SHOT
FLYERS
8
International Basketball is from Andrew Spencer author of the 'Sensational Best-Seller' International Soccer.
Every single 'Elite' product carries the unique 'Elite' Holographic Sticker. Make sure your copy does. It's your guarantee of quality.
Mail Order
Just send a cheque or P.O. payable to 'Elite' or quote your Visa number.
An Andrew Spencer
elite
-Joint Production
Elite Systems Limited Anchor House Anchor Road Aldridge Walsall West Midlands Telephone (0922) 55852 Telex 335622 SPETEL G





Shoot to win!

Winning is all that matters when playing video games. SVI "QuickShot" joysticks give you a better grip on games which are getting tougher each day. That's why over 4.5 million have been sold since 1982.

SVI "QuickShot" is the original, award-winning joystick that offers true one-hand control with features like a hand-contoured controller, thumb/trigger fire button and suction cups that give the thrill of arcade game play.

SVI "QuickShot" joysticks are getting better each day. They have more winning features than ever. There are models with auto-fire switch, touch-firing pad, interchangeable controllers and for the latest MSX computers.

Go with the winner and see the wide range of SVI "QuickShot" joysticks at your nearest dealer.

SVI "QuickShot" Joysticks.
4,500,000 Sold Worldwide.

SVI™ INNOVATIVE COMPUTING
FOR TODAY AND TOMORROW

SPECTRAVIDEO

SOLE AGENT:
Spectravideo Ltd.
165 Garth Road Morden, Surrey SM4 4LH U.K.
Tel.: 01-3300101 Tlx.: 28704 MMHVAN G

DISCOVERY

THE NEW DISC DRIVE SENSATION

At last Spectrum owners can choose a TRUE disc drive system for their computer, backed by REAL software support and available with the most comprehensive specification yet developed.

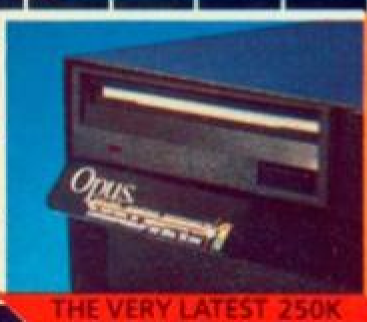
For just £199.95 Discovery offers a new level of performance and a combination of advanced features which make other fast storage systems for the Spectrum and Spectrum + look obsolete.

No wonder one leading computer magazine, Sinclair User, recommended Discovery in its latest guide to fast storage systems for the Spectrum.

Discovery has been designed to take no USER RAM from the Spectrum during the use of tape-based programs, it accepts the same commands as 'Interface I' allowing you to use many of the cassette programs designed for microdrive and we've even provided you with the firmware to use a super fast RAM DISC when you choose. Random Access Files are fully supported and formatting and back-up routines are included in ROM.

Add to all this a range of great software titles on the latest 3½" disc cartridges commissioned by Boots and you begin to see why we named it Discovery.

Discovery is available from larger branches of Boots and selected computer stores nationwide. For further details call us on 0737 65080 or post the coupon now.

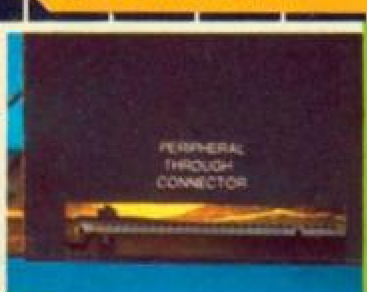

THE VERY LATEST 250K JAPANESE 3½" DISC DRIVE



VIDEO MONITOR PORT



JOYSTICK INTERFACE



PERIPHERAL THROUGH CONNECTOR



PARALLEL PRINTER PORT



£199.95

NO OTHER SYSTEM HAS SO MUCH TO OFFER AND ALL FOR ONLY £199.95

Please rush me the following (ALL PRICES INCLUDE VAT & CARRIAGE)

☐ Discovery 1 unit(s) at £199.95 each ☐ Discovery 2 unit(s) at £329.95 each

I enclose a cheque for £ ______ or please debit my credit card account with the amóut óf £ ______

My Access☐ Barclaycard☐ (tick) no. is ______

Name ______

Address ______

______

______

Telephone ______

Opus. Opus Supplies Ltd

To: Opus Supplies Ltd, 55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey. 0737 65080

BAL 084/5

Thinking software?

THE TASWORD WORD PROCESSORS

The extensive features of the Tasword word processors are ideal for both the home and business user. Every Tasword comes complete with a comprehensive manual and a cassette or disc. The cassette or disc contains your TASWORD and TASWORD TUTOR. This teaches you word processing using TASWORD. Whether you have serious applications or simply want to learn about word processing, TASWORD and TASWORD TUTOR make it easy and enjoyable.

TASWORD TWO (Spectrum)

64 characters per line on the screen!

"Without doubt, the best utility I have reviewed for the Spectrum."
HOME COMPUTING WEEKLY APRIL 1984

"If you have been looking for a word processor, then look no further."
CRASH JUNE 1984

The cassette program is supplied with instructions for microdrive conversion.

TASWORD TWO* ZX 48K Spectrum — cassette **£13.90**
microdrive cartridge **£15.40**

TASWORD EINSTEIN

A sixty-four character per line display and the ability to hold over five hundred lines of text at any time are just some of the features of this, the most recent of the Taswords. Full interaction with the disc system — e.g. Tasword detects the presence of added drives and allows their use.

TASWORD EINSTEIN Tatung Einstein — disc **£19·95**

TASWORD MSX

With all the features of the Spectrum Tasword Two including the amazing sixty four character per line display. The Tasword MSX machine code program utilises the 32K of memory not normally available to Basic allowing over five hundred lines of text to be held in memory.

TASWORD MSX* 64K MSX Computers
Fully inclusive mail order price — **£13·90**
(cassette includes both disc and tape versions)

TASWORD 464

"There is no better justification for buying a 464 than this program."
POPULAR COMPUTING WEEKLY NOVEMBER 1984

A particularly sophisticated yet easy to use program. Now available on disc. The cassette version is supplied with instructions for transferring to disc.

TASWORD 464* Amstrad CPC 464 & 664 — cassette **£19·95**
disc **£22·95**

TASWORD 464-D

This is the new Tasword especially developed to utilise the capabilities of the CPC 464 and 664 disc drives. A major new feature is a powerful mail merge facility. Tasword 464-D will only run on, and is only supplied on, disc. ▷

TASWORD 464-D Amstrad CPC 464 & 664 — disc **£24·95**

THE TASPRINT STYLE WRITERS

A must for dot-matrix printer owners! Print your program output and listings in a choice of five impressive print styles. The Tasprints utilise the graphics capabilities of dot matrix printers to form, with a double pass of the printhead, output in a range of five fonts varying from the futuristic Data-Run to the hand writing simulation of Palace Script. A TASPRINT gives your output originality and style! The TASPRINTS drive all Epson compatible eight pin dot-matrix printers, e.g.

	NEC PC-8023B-N	BROTHER HR5
EPSON FX-80	MANNESMANN TALLY MT-80	SHINWA CP-80
EPSON RX-80	STAR DMP 501/515	DATAC PANTHER
EPSON MX-80 TYPE III	COSMOS-80	DATAC PANTHER II

Five impressive print styles for your use:

COMPACTA - bold and heavy, good for emphasis
DATA-RUN → A FUTURISTIC SCRIPT
LECTURA LIGHT - clean and pleasing to read
MEDIAN - a serious business-like script
PALACE SCRIPT - a distinctive flowing font

Typical Tasprint output. Please note that different makes of printer produce different sized output.

TASPRINT (Spectrum)

Drives all the printer interfaces compatible with TASWORD TWO and can be used to print TASWORD TWO text files as well as output from your own Basic programs.

TASPRINT 48K Spectrum — cassette **£9·90**
microdrive cartridge **£11·40**

TASPRINT EINSTEIN

Print TASWORD EINSTEIN text files in one or more of the TASPRINT fonts.

TASPRINT EINSTEIN — disc **£14·95**

TASPRINT QL

TASPRINT QL includes a screen editor used to modify files created by other commercial software, such as QUILL, or by the user from BASIC. These modified files include TASPRINT control characters and may be printed, using TASPRINT, in one or more of the unique TASPRINT fonts.

TASPRINT QL Sinclair QL — microdrive cartridge **£19·95**

TASPRINT 464

Can be used to print AMSWORD/TASWORD 464 text files in addition to output from your own Basic programs. Drives the **Amstrad DMP-1** in addition to the printers listed above.

TASPRINT 464 Amstrad CPC 464 & 664 — cassette **£9·90**
disc **£12·90**

TASWORD UPGRADES

Tasword 464 and Amsword owners: send your original cassette or disc (not the packaging) as proof of purchase. Your original will be returned together with Tasword 464-D on disc. **£13·90**

*Available from larger branches of Boots

QL is a trademark of Sinclair Research Limited

. . . think Tasman

THE TASCOPY SCREEN COPIERS

The TASCOPY screen copiers print high resolution screen copies with different dot densities and patterns for the various screen colours. This gives the screen copies a shaded effect which presents on a monochrome scale the colours on the screen. With TASCOPY you can keep a permanent and impressive record of your screen pictures and diagrams. TASCOPY supports all the printers mentioned under TASPRINT.

TASCOPY (Spectrum & Interface 1)

The Spectrum TASCOPY is for use with the RS232 output on ZX Interface 1. It produces monochrome copies (in a choice of two sizes) as well as copies with the shaded "grey scale" effect described above.

TASCOPY ZX Spectrum	cassette	**£9·90**
	microdrive cartridge	**£11·40**

TASCOPY QL

TASCOPY QL adds new commands to the QL Superbasic. Execute these commands to print a shaded copy of the screen contents. Print the entire screen or just a specified window. TASCOPY QL also produces large "poster size" screen copies on more than one sheet of paper which can then be cut and joined to make the poster, and high speed small copies.

TASCOPY QL Sinclair QL	microdrive cartridge	**£12·90**

TASCOPY 464

Adds two new commands to the 464 Basic to give both a standard shaded screen copy as well as a "poster size" copy which is printed onto two or four sheets which can be cut and joined to make the poster.

TASCOPY 464 Amstrad CPC 464 & 664	cassette	**£9·90**
	disc	**£12·90**



Available from good software stockists and direct from:

TASMAN SOFTWARE

Springfield House, Hyde Terrace, Leeds LS2 9LN · tel (0532) 438301

Telephone Access/Visa orders: Leeds (0532) 438301

PLUS . . .

TASWIDE The Screen Stretcher

With this machine code utility you can write your own Basic programs that will, with normal PRINT statements, print onto the screen in the compact lettering used by TASWORD TWO. With TASWIDE you can double the information shown on the screen!

TASWIDE ZX 16K + 48K Spectrum	**£5·50**

TASMERGE The Mail Merger

Transfer data from MASTERFILE to TASWORD TWO! Letters and forms typed on TASWORD TWO can be printed with addresses and data taken from MASTERFILE. The mail merge facility allows, for example, multiple copies of a letter to be printed, each containing a different name and address taken from your MASTERFILE data. To use TASMERGE you must have one or more microdrives as well as TASWORD TWO and MASTERFILE by Campbell Systems (version 9 or later).

TASMERGE ZX 48K Spectrum	**£10·90**

TASMAN PRINTER INTERFACE

Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable and driving software. The user changeable interface software makes it easy to send control codes to your printer using the method so successfully pioneered with TASWORD TWO. The cassette contains fast machine code high resolution full width SCREEN COPY SOFTWARE for Epson, Mannesmann Tally, Shinwa, Star, and Tandy Colour Graphic (in colour!) printers. TASCOPY, shaded screen copy software for this interface (value £9·90 — see description on left) is included in this package.

CENTRONICS INTERFACE ZX Spectrum	**£39·90**

COMPUTER PRINTER CABLES

RS232 for ZX INTERFACE 1	**£14·50**
MSX CENTRONICS	**£8·00**
AMSTRAD CPC 464 CENTRONICS	**£9·90**

If you do not want to cut this magazine, simply write out your order and post to: TASMAN SOFTWARE · DEPT YC · Springfield House · Hyde Terrace · Leeds LS2 9LN

I enclose a cheque/PO made payable to TASMAN SOFTWARE Ltd OR charge my

ACCESS/VISA number: ____________

NAME	ITEM	PRICE
____	____	£ ____
ADDRESS	____	£ ____
____	____	£ ____
____	____	£ ____
____	Outside Europe add £1 airmail per item	£ ____
____	TOTAL	£ ____

Send me the free Tasman brochure describing your products: ☐ Tick here

I would like to know more about your programs for (please tick):

QL ☐ Tatung Einstein ☐ ZX Spectrum ☐ MSX ☐ Amstrad CPC 464 & 664 ☐

All prices include VAT and packaging.

CZECH MATE ON SINCLAIR'S BOARD

"I AM ABSOLUTELY DELIGHTED. Robert Maxwell is a really great bloke". That's Sir Clive's gushing reaction to the financial saviour of Sinclair Research. But just how the computing public will react to a Sinclair Research without Sinclair himself in charge and still pushing the buttons is another matter. After all, with Sir Clive only acting as a research and development consultant, how can the company ever be the same again?

The enthusiasm of Sinclair's creditors may also be qualified. They'll be pleased to see some money coming their way, but disappointed at the lack of new orders. As a result Timex has already laid off 400 workers from its Dundee production line where so many Spectrums have been built.

Sinclair Research must create new products if it is to have a long-term future. The fact that the company doesn't seem to be producing more of its existing computers is understandable. At the current rate of sales, the £34 million of warehouse stock that Maxwell has inherited should see the company into the autumn – and, pessimistically, even beyond that.

If the new Sinclair does try ploughing on into 1986 with old machines the company will cease to exist: Sinclair without innovation isn't Sinclair.

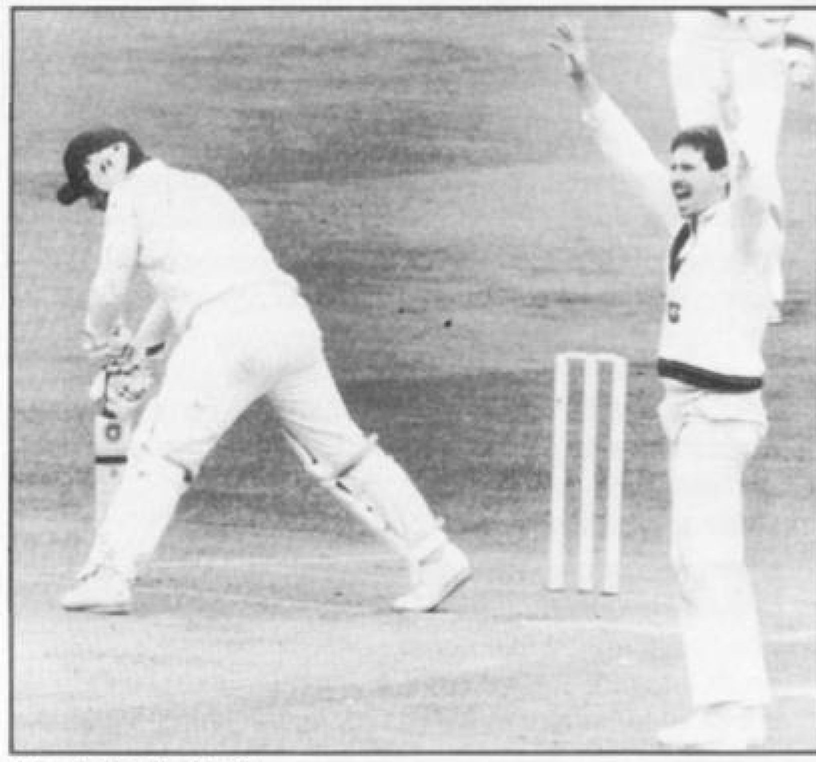
Worse, the whole industry without a steady flow of increasingly sophisticated computers will also flounder. This year for the first time it is the software houses and not the computer manufacturers who have been making all the running. They've been the ones to come up with the new ideas that keep the industry going.

But that can continue for only so long. Once they run up against the limits of machines which in most cases are several years old, there will be nothing to sustain the public's interest.

Clive Sinclair's outburst of delight at the Maxwell take-over shows his relief that the company he made great will continue to exist. Maxwell in turn must recognise the importance of Sinclair's continued participation in the firm's and the market's future.

Provided he capitalises on Sinclair's talents there may still be a British home-computing manufacturing industry for Acorn to return to when and if it staggers to its feet after its second knock-out in four months.

Editor: TOBY WOLPE; **Assistant Editor:** MEIRION JONES; **Production Editor:** IAN VALLELY; **Software Editor:** SIMON BEESLEY; **Commercial Software Editor:** PAUL BOND; **Editorial Assistant:** LEE PADDON; **Editorial Secretary:** LYNN DAWSON. Editorial: 01-661 3144. **Advertisement Manager:** NICK RATNIEKS 01-661 3127; **Assistant Advertisement Manager:** KEN WALFORD 01-661 8548; **Senior Sales Executive:** JULIAN BIDLAKE 01-661 8458; **Advertisement Executive:** KAY FILBIN 01-661 8484; **Northern Office:** GEOFF PARKER 061 872 8861; **Advertisement Secretary:** MAXINE GILL; **Classified:** SUSAN PLATTS 01-661 3036; **Publisher:** GAVIN HOWE; **Group Advertisement Manager:** SHOBHAN GAJJAR. Your Computer, Room L221, Quadrant House, The Quadrant, Sutton Surrey SM2 5AS. Printed in Great Britain for the proprietors Business Press International Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Tel: 01-661 3500, Telex/grams: 892084 BIPRESG ISSN 0263-0085. Printed by Riverside Press Ltd, Whitstable, Kent, and typeset by Instep Ltd, London EC1. Subscriptions: U.K. £14 for 12 issues. ABC 131, 769 July-December, 1984.



Was he leg before?

ROBOTS — HOWZAT?!

DICKY BIRD is not going to be replaced by a Dalek yet but micros could soon be helping umpires with tricky leg before wicket decisions. The Test and County Cricket Board is sponsoring research into using cameras linked to a computer to plot the probable course of the ball after it has hit someone's pads which would indicate to the umpire whether it was plumb or not.

The idea comes from Jodrell Bank Radio Astronomer and cricket fanatic Sir Bernard Lovell whose last idea for an electronic aid to show whether catches behind the wicket came off bat or pad is still at the prototype stage. This was a microphone in the bat itself — well Australian T.V. puts a mike in the stumps — with headphones for the umpire. So far Sir Bernard's most successful electronic cricketing innovation is an improved light meter used at Old Trafford.

500,000,000K

LASER MEMORY could be in our homes before Christmas. By then Atari's Rob Harding expects to be selling a Compact Disc Rom Player for the ST with a capacity of half a Gigabyte per disc — that's 500 Megabytes, enough to swallow every telephone directory in Britain — and for a price of less than £500. The only catch is that the CD Rom is read only — the technology to write to laser discs is still prohibitively expensive.

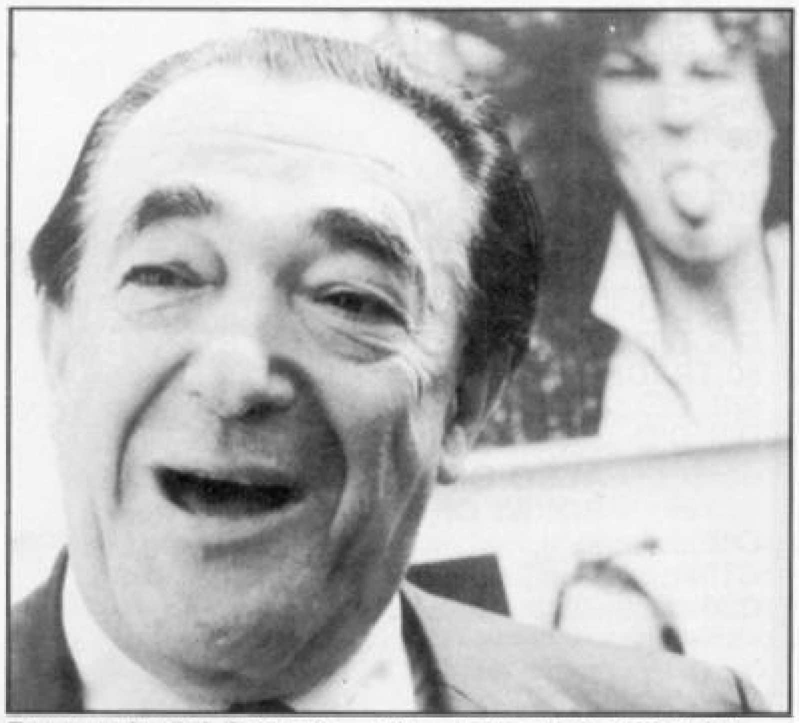
At the Chicago Consumer Electronics Show Atari demonstrated the CDRP player with a disc containing an entire 15 volume encyclopaedia. The text only took up a third of a disc with pictures and a comprehensive index filling the rest. Arcade-style laser games will be possible and at the flick of a switch the machine doubles up as an ordinary compact disc music player.



ST will have giga disk.

SINCLAIR COUP

Bob's your uncle, Clive





Ever popular Bob Maxwell — (live shows off the big wafer).

SIR CLIVE is back at the drawing board now that *Daily Mirror* owner Robert Maxwell is paying £12 million to take over Sinclair Research. Desperate financial trouble had led the Bank of England to try to organise a rescue, but Sinclair is still not safe.

Timex has laid off 400 Spectrum Plus assembly workers because there are no more orders and the future of the pocket television looks shaky, because Polaroid has stopped making the long life lithium batteries for it. When the stockpile runs out Sinclair will switch to short life Zinc Carbon batteries.

Maxwell is looking for a new chief executive now that Sir Clive, who admits he is "awful at managing established businesses", has left the board to concentrate on research. Paradoxically his Metalab announced a breakthrough in wafer scale integration just days before the Maxwell deal.

The problem with conventional chip production is that on each wafer of silicon some chips are faulty so you cannot produce a complete computer on one slice. Metalab uses Ivor Catt's idea of configuration logic — a built-in circuit which checks and bypasses any faulty areas on the wafer.

AMSTRAD PIRACY DOUBLE-DECKER

SELLING A high-speed twin-cassette stereo deck which could be used to copy pre-recorded music or program cassettes was an inducement to infringe copyright according to Mr Justice Whitford in the High Court. The case is doubly embarrassing to Amstrad which makes the decks because it also supplies commercial software through its Amsoft operation.

Despite legal costs of £100,000 Amstrad intends to appeal against the ruling which was in favour of the British Phonographic Industry who are now seeking damages from Amstrad. According to BPI's legal adviser Patrick Isherwood high-speed twin cassette decks will only



Sugar "condemns piracy".

be allowed to be sold if "accompanied by adequate warning notices about the copyright infringement — notices so explicit that they are likely to make the machines unattractive to the retailer".

If the ruling stands it could be used by organisations like the Guild of Software Houses and the Federation Against Software Theft to take action against companies like Evesham Micros which makes the Interface III program copier (Don't Touch, page 14, *Your Computer* July 1985). Roger Tuckett of FAST has called Justice Whitford's ruling "a welcome development".

Meanwhile the new copyright law has encouraged MicroPro — who wrote Wordstar — to look for a test case immediately.

Wally's paradise is a 64K Spectrum

MIKRO-GEN'S latest box of tricks will turn software pirates into a bunch of wallies — and also give Mikro-Gen's own programmers almost 50 percent more memory to work with.

The Mikro-Plus Interface for the Spectrum is like Imagine's much talked about idea for Megagames. It's a hardware way of selling software. You pay £14.95 for a game on Mikro-Plus which overlays the Spectrum's Rom and includes a joystick port. The game itself won't be copiable because part of it is burnt into the Mikro-Plus's 16K's worth of Eproms. The rest of it comes supplied on cassette.

Shadow of the Unicorn, a role-playing adventure with 10 characters, will be the first program supplied on the cigarette-packet sized Mikro-Plus and will be out in mid-September. Mikro-Gen's new Wally game for the Christmas period, Three Weeks in Paradise, is not only a change in style but will also be appearing on Mikro-Plus Interface.

Booked — FBI pulls the Cracker

"I WAS a teenage hacker" confesses Bill Landreth, alias The Cracker, in *Out of the Inner Circle*, a newly released Penguin book he wrote while on probation after the FBI finally caught him after a lifetime of computer crime at the grand old age of 19 while tapping into Telemail which serves NASA, Coca Cola and General Motors.

Big Blue screen blur

SORE EYES? Nagging headaches? You could be another victim of VDU health hazards. The good news according to a comprehensive report on the subject put together by IBM is that extra metal shielding could cut out the problem. These shields are already a requirement in the States but not as yet in the U.K.

DIARY

RICHARD AUSTIN of Evesham Micros wants to thank GOSH and FAST "for their outburst against our product, Interface III, in July's *Your Computer*. He claims he is crying into his champagne as he celebrates the success of his product.

IT'S BEEN a bad few weeks for computers and robots. First there was the slight hitch with President Reagan's Star Wars extravaganza when the space shuttle insisted on looking for a 10,000 mile high mountain to make the laser test a little easier. Then an Edinburgh restaurant refused to pay for a Donic robot which it had bought second hand after it allegedly went beserk knocking over tables before its head fell off into a customer's lap. Now a Naughty Words Editor to stop people like the man who wrote the Amsdisk program — he sends his sincere apologies by the way — from filling up bulletin boards with obscenities has gone out of control. All messages including the word title are being censored.

ALAN SUGAR produced a bird watcher who makes recordings of wild life noises and copies them for friends, as an example of the typical tape-to-tape cassette user in the Amstrad double-decker piracy trial. The judge was not impressed.

SAD STORY from Brian Raine who went to Bournemouth Computer Club clutching his copy of *Your Computer* and complained that "piracy was the main activity". He was laughed at and the leader of one user group admitted that he asks his 8 year old daughter to make copies for him to avoid prosecution. Brian wants GOSH to guarantee that they will replace faulty tapes — in case software houses go bankrupt.

SOME TRANSPARENCIES from Datasoft disappeared before we saw them — Ah said Datasoft "that's because we put in a fake doubloon — somebody must have thought it was real". We are looking for a tall, one-legged man with a parrot on his shoulder . . .

Elsie Dee

DOWN AGAIN

Acorn's second problem

ACORN'S CRISIS has deepened with the suspension for the second time of its shares, which had sunk to 11p on the Stock Exchange. At the same time Junior Industry Minister John Butcher wants an end to Acorn's exclusive and lucrative BBC contract to let companies like ACT in.

According to Close Brothers — Acorn's financial advisers — "the market for home and small personal computers has become even more difficult and a further and very substantial decline has occurred in sales from the levels predicted earlier this year. This has led to a significant deterioration in the financial position of Acorn". Two weeks earlier ACT, which is muscling into BBC country with its 16-bit F1E micro, announced it had made record £92 million sales and £10 million profit.

With home computer sales running at one third of last year's in some areas Acorn finds itself sitting on a stockpile of at least 70,000 Electrons while the BBC Plus is still not selling despite a panic £30 price cut. Olivetti, which bought 49.3 per cent of Acorn the last time it needed rescuing, could increase its stake to a majority and sell off Acorn subsidiaries like Acornsoft.



Will Acorn be submerged by ACT?

One industry analyst points out that with sales of nearly £2 billion a year "Acorn is less than petty cash to them" but if high-flying ex IBM troubleshooter Alex Uboldi, who has been put in as emergency Managing Director, cannot quickly find a new strategy for Acorn's survival then Olivetti may pull out. Acting Chairman Alex Reid may have had his spaghetti.

FREE MODEM WITH DRIVE

COMMODORE IS about to dump £20 million worth of kit on the market at half price but most of it seems to be business machines. Meanwhile general manager Nick "smile at the rain" Bessey claims he can maintain the price of the 64 and "break the seasonal stranglehold which has dogged the home computer industry".

Good offers on peripherals include 1541 disc drive, with disc software, plus modem and one year's Compunet subscription for £229.

Despite the launch of the CBM-128 in September Bessey says the 64 will continue through 1986. Certainly software and peripheral makers are sticking with the Commodore 64.


Graphics Mouse expands 64.

Commodore's own Sound Studio and Sampler programs for the 64 come out at the same time as Activision's Music Studio, and Datex is showing the M/S 1 Graphics Mouse which purports to give the 64 Macintosh style graphics — at lower resolution but in colour.

If your name is MUD it's for you

BRITISH TELECOM turns dungeons and dragons into big business next month with the launch of its Multi-User Dungeon which will allow anyone with a modem and £20 to join "the largest interactive computer game in the world". MUD can accept over 100 simultaneous players and a permanent Arch Wizard will watch out for foul play.

MUD will operate from 6.00 pm to 8.00 am and all day at weekends. Originally written by Roy Trubshaw and Richard Bartle, MUD can still be played in the early hours on the Essex University Dec computer, but the BT version claims to be bigger and better.

SOFTWARE



AT UNBEATABLE PRICES!

UP TO 50% OFF MANUFACTURER'S REC. RETAIL PRICES

TRADE AND EXPORT ENQUIRIES WELCOME

A superb selection of the top cassette based titles for all popular makes of computers are offered with up to 50% discount off the manufacturer's recommended retail prices. No messing, full money back guarantee if not highly delighted. If you don't see the title you are looking for, send for our FREE 'descriptive' catalogue of all the titles we have available.

Producer	Item No.	Title	RSP inc. VAT £	Sale Price £
BBC				
Cascade	1	CASSETTE 50	9.95	4.99
Imagine	2	BC BILL	5.50	2.59
Imagine	3	PEDRO	5.50	2.59
Micro Power	4	DANGER UXB	7.95	4.79
Micro Power	5	THE MINE	7.95	4.79
OIC	7	DODGY DEALER	6.50	3.29
Quicksilva	8	BEEB ART	14.95	7.99
Quicksilva	9	MUSIC PROCESSOR	14.95	7.99
Superior	10	COSMIC KID	7.95	3.79
Virgin	11	CHECKOUT	7.95	5.19
Visions	12	DEMOLATOR	6.95	3.29
Visions	13	PENGI	5.95	3.29
A & F	139	COPTER CAPERS	6.90	3.99
A & F	140	HAUNTED ABBEY	6.90	3.99
Acornsoft	141	FACEMAKER	9.95	5.99
Acornsoft	142	HIDE AND SEEK	9.95	5.99
Acornsoft	143	LET'S COUNT	9.95	5.99
Acornsoft	144	NUMBER CHASER	9.95	5.99
Acornsoft	145	NUMBER GULPER	9.95	5.99
Acornsoft	146	NUMBER PUZZLER	9.95	5.99
Acornsoft	147	TABLE ADVENTURE	9.95	5.99
Acornsoft	148	WORDS WORDS WORDS	9.95	5.99
Alligata	149	CHARTBUSTER	9.95	5.29
Alligata	150	DOUBLE ADVENTURE	7.95	4.19
Alligata	151	SON OF BLAGGER	7.95	4.19
Alligata	153	STARSHIP DISCOVERY	7.95	4.19
Alligata	154	TARZAN	7.95	4.19
Alligata	155	UNCLE CLAUDE	7.95	4.19
Bug Byte	156	TWIN KINGDOM VALLEY	9.50	5.19
Level 9	157	COLOSSAL ADVENTURE	9.90	5.29
Level 9	159	SNOWBALL	9.90	5.29
Micro Power	161	CYBERTRON MISSION	7.95	4.69
Micro Power	162	GALACTIC COMMANDER	7.95	4.69
Micro Power	163	GHOULS	7.95	4.69
Micro Power	164	INTERGALACTIC TRADER	8.95	4.69
Micro Power	165	KILLER GORILLA	7.95	4.69
Micro Power	166	STOCK CAR	7.95	4.69
Romik	167	ALIEN BREAK IN	6.99	3.29
Romik	168	BIRDS OF PREY	6.99	3.29
Superior	169	HUNCHBACK	7.95	3.99
Superior	170	OVERDRIVE	7.95	3.99
Superior	171	STAR STRIKER	7.95	3.99
Superior	172	WALLABY	7.95	3.99
Visions	173	DARE DEVIL DENNIS	7.95	3.99
Visions	174	SNOOKER	8.95	4.19
Wilcox	175	BLUE THUNDER	6.95	3.29
Superior	278	AIRLIFT	7.95	3.79
Superior	279	JACK & THE BEANSTALK	7.95	3.79
Superior	280	SPACE PILOT	7.95	3.79
BBC & ELECTRON				
Lothlorien	14	THE STOLEN LAMP	6.95	3.29
Lothlorien	281	JOHNNY REB	6.95	4.25
Micro User	346	MAGIC SWORD	8.95	4.99
COMMODORE				
Anirog	15	BONGO	7.95	4.99
Anirog	16	CYBOTRON	7.95	4.99
Anirog	17	PETCH	6.95	3.99
Anirog	18	SPACE PILOT	7.95	4.29
CRL	19	DERBY DAY	7.95	4.29
CRL	20	OMEGA RUN	7.95	4.29
CRL	21	WHIRLYBIRD	7.95	4.29
DKTronics	22	SPEED DUEL	5.95	2.99
Games Machine	23	SKULL	7.95	3.79
Imagine	24	ARCADIA	5.50	2.59
Imagine	25	BC BILL	5.50	2.59
Imagine	26	COSMIC CRUISER	5.50	2.59
Interceptor	27	TROLLIE WALLIE	7.00	3.79
Melbourne House	30	CLASSIC ADVENTURE	6.95	3.99
Micro Power	32	SWOOP	6.95	4.29
Phoenix	33	ATTACK ON WINSCALE	6.99	3.49
Phoenix	34	QUEST FOR GARDEN OF EDEN	6.99	3.49
Phoenix	35	THE SORCERERS APPRENTICE	6.99	3.49
Quicksilva	36	AQUAPLANE	7.95	4.29
Quicksilva	37	BOOGABOO THE FLEA	7.95	4.29
Quicksilva	38	FRED	7.95	4.29
Quicksilva	39	TRAFFIC	7.95	4.29
Tasket	40	GYROPOD	6.90	3.29
Tasket	41	JAMMIN	6.90	3.29
Terminal	42	HUNTER	7.95	3.79
Terminal	43	SUPER SKRAMBLE	7.95	3.79
Terminal	44	TOURNAMENT	7.95	3.79
Thor	45	3D SILICON FISH	5.95	2.99
Virgin	46	AMBUSH	7.95	5.59
Virgin	47	FALCON PATROL	6.95	4.59
A&F	217	CHUCKIE EGG	7.90	4.19
A&F	218	GUMSHOE	7.90	4.19
Alligata	219	CHARTBUSTER	9.95	5.29
Alligata	220	GUARDIAN	7.95	4.29
Alligata	221	SON OF BLAGGER	7.95	4.29
Anirog	222	GALAXY	7.95	4.29
Anirog	224	KONG	7.95	4.19
Artic	225	HUMPTY MEETS FUZZY W	6.95	3.29
Bug Byte	226	STAR TRADER	7.95	4.29
Bug Byte	227	TWIN KINGDOM VALLEY	9.50	4.29
Interceptor	228	HEROES OF KARN	7.00	3.79
Level 9	229	LORDS OF TIME	9.90	4.79
Lothlorien	230	JOHNNY REB	6.95	3.29
Micro Power	231	CYBERTON MISSION	6.95	3.29
Micro Power	232	FELIX IN THE FACTORY	6.95	4.19
Micro Power	233	GHOULS	6.95	4.19
Micro User	234	OLYMPICS	5.95	2.99
Ocean	236	CAVELON	6.90	3.29
Ocean	237	CHINESE JUGGLER	6.90	3.29
Ocean	239	HUNCHBACK	6.90	3.29
Romik	241	DICKY'S DIAMONDS	6.99	3.29
Romik	242	THE GREAT NORDIC WAR	8.99	4.29
Terminal	243	LAZY JONES	7.95	3.99
Terminal	244	PLUMB CRAZY	7.95	3.99
Terminal	245	STAR COMMANDO	7.95	3.99
Thor	246	JACK & THE BEANSTALK	7.95	3.99
Visions	247	1994	6.95	3.29
Visions	248	DARE DEVIL DENNIS	7.95	3.99
Visions	249	SNOOKER	8.95	4.29
Wilcox	250	BLUE THUNDER	6.95	3.29
Anirog	282	CATACOMBS	7.95	3.79
Anirog	283	PC FUZZ	7.95	3.79
Artic	284	ENGINEER HUMPTY	6.95	4.25
Artic	285	HUMPTY IN THE GARDEN	6.95	4.25
Imagine	286	PEDRO	5.50	2.99
Interceptor	287	AQUANAUT VTX RAIDER	6.99	3.59
Interceptor	288	BIG BEN	7.00	3.59
Interceptor	289	GUZZLER	7.00	3.59
Superior	290	MR WIZZ	7.95	3.79
Anirog	303	ZAGA MISSION	7.95	4.95
Anirog	304	ZODIAC	7.95	4.95
Beyond	305	ANKH	8.95	4.95
Beyond	306	AZTEC	8.95	4.95
Beyond	307	MR ROBOT & THE FACTORY	8.95	4.95
Games Machine	308	FABULOUS WANDA	7.95	3.99
Interceptor	309	QUANGO	7.00	3.99
Kerian	310	HELLIMATHS	5.95	3.19
Kerian	311	SPELLICOPTER	5.95	3.19
Ocean	312	STUNT BIKE	6.90	3.79
PSS	313	BATH TIME	7.95	4.95
PSS	314	HYPER BIKE	7.95	4.95
PSS	315	CRYSTALS OF ZONG	7.95	4.95
Palace	316	EVIL DEAD	6.99	3.79
Quicksilva	317	QUINTIC WARRIOR	7.95	4.95
Quicksilva	318	RING OF POWER	9.95	5.29
Quicksilva	319	STING 64	7.95	4.95
Tasket	320	POSTER PASTER	6.90	3.99
VIC 20				
Bug Byte	106	SCRAMBLE	6.95	3.69
Imagine	108	ARCADIA	5.50	2.99
Interceptor	109	CRAZY KONG	6.00	3.19
Interceptor	110	WUNDA WALTER	6.00	3.19
Quicksilva	113	SUBSPACE STRIKER	7.95	4.29
Quicksilva	114	TORNADO	5.95	3.19
Terminal	115	GRIDDER	6.95	3.29
Terminal	117	SKRAMBLE	6.95	2.29
Thor	118	3D SILICON FISH	5.95	2.99
Thor	119	LUV BUG	5.95	2.99
Thor	120	OLLY	6.95	3.29
Virgin	121	CREEPERS	5.95	4.19
DRAGON				
Cascade	50	CASSETTE 50	9.95	4.69
Imagine	51	BC BILL	5.50	2.59
Imagine	52	COSMIC CRUISER	5.50	2.59
Imagine	53	PEDRO	5.50	2.59
CRL	337	ST GEORGE & THE DRAGON	4.95	3.99
CRL	338	KEY OF WRATH	8.95	3.99
Oasis	339	OTHELLO	5.95	3.59
Oasis	340	INVADERS	5.95	3.59
Oasis	341	DOMINOES	5.95	3.59
Oasis	342	DRAGON CHESS	9.95	5.59
Oasis	343	BACKGAMMON	5.95	3.59
CRL	344	ESCAPE FROM MANHATTAN	3.95	2.99
ELECTRON				
Micro Power	54	DRAW	8.95	5.49
Lothlorien	55	JOHNNY REB	6.95	3.49
SHARP				
Sharpsoft	57	BUGS	6.95	3.29
Sharpsoft	58	RAID	6.95	3.29
SPECTRUM				
Anirog	59	KONG	5.95	3.29
Arcade	60	BUBBLE TROUBLE	5.50	2.99
Arcade	61	THE PRIZE	5.50	2.99
Artic	62	MR WONG'S LAUNDRY	6.95	3.29
Bug Byte	63	CAVERN FIGHTER	5.95	3.29
Bug Byte	64	COMP COOK BOOK	9.50	5.19
Cascade	65	CASSETTE 50	9.95	4.69
CDS	66	POOL	5.95	2.99
CDS	67	WINGED WARLORDS	5.95	2.99
CRL	68	3D DESERT PATROL	4.95	2.99
CRL	69	AHHH!!!	5.95	3.39
CRL	70	GLUG GLUG	5.95	3.39
CRL	71	HANDICAP GOLF	5.95	3.39
CRL	72	OLYMPICS	5.95	3.39
CRL	73	PANDEMONIA	5.95	3.39
CRL	74	THE OMEGA RUN	5.95	3.39
Crystal	75	HALLS OF THE THINGS	7.50	3.99
Crystal	76	THE DUNGEON MASTER	7.50	3.99
DKTronics	77	SPEED DUEL	5.95	2.99
DKTronics	78	ZIG ZAG	6.95	3.59
Games Machine	79	SKULL	6.95	3.59
Gargoyle	80	AD ASTRA	5.95	2.89
Imagine	81	ARCADIA	5.50	2.59
Imagine	82	BC BILL	5.50	2.59
Imagine	83	COSMIC CRUISER	5.50	2.59
Imagine	84	JUMPING JACK	5.50	2.59
Imagine	85	PEDRO	5.50	2.59
Lothlorien	86	MICROMOUSE	5.95	2.99
Melbourne House	87	MUGSY	6.95	3.99
Ocean	90	CHINESE JUGGLER	5.90	2.99
Ocean	91	ESKIMO EDDIE	5.90	2.99
Ocean	93	MOON ALERT	5.90	2.99
Phoenix	94	JOKERS WILD	6.99	3.29
Quicksilva	95	ANT ATTACK	6.95	3.79
Quicksilva	96	BOOGABOO THE FLEA	6.95	3.79
Quicksilva	97	DRAGONSBANE	6.95	3.79
Quicksilva	98	FRED	6.95	3.79
Quicksilva	99	LASERZONE	6.95	3.79
Quicksilva	100	SNOWMAN	6.95	3.79
Virgin	101	RACING MANAGER	5.95	4.29
Virgin	102	SORCERY	5.95	4.29
Visions	103	1994	6.95	3.29
Visions	104	SOS	6.95	3.29
A&F	186	CHUCKIE EGG	6.90	3.79
Artic	187	ENGINEER HUMPTY	6.95	3.29
Artic	188	HUMPTY IN THE GARDEN	6.95	3.29
Artic	189	HUMPTY MEETS FUZZY W	6.95	3.29
Artic	190	ON THE OCHE	6.95	3.29
Artic	191	WORLD CUP FOOTBALL	6.95	4.79
Beyond	193	PSYTRON	7.95	3.79
Beyond	194	SPELLBOUND	5.95	2.99
Bug Byte	195	ANTICS	6.95	3.79
Bug Byte	197	POOL	5.95	3.79
Bug Byte	198	RAPSCALLION	6.95	3.79
Bug Byte	199	STAR TRADER	6.95	3.79
Bug Byte	200	TWIN KINGDOM VALLEY	7.95	4.19
Digital	201	FIGHTER PILOT	7.95	4.19
Digital	202	NIGHT GUNNER	5.95	3.79
Imagine	205	STONKERS	5.50	2.59
Interceptor	206	FOREST/WORLD'S END	5.50	2.99
Interceptor	207	TILER	5.50	2.99
Kerian	208	TURBO CHESS	5.95	2.99
Lothlorien	212	CONFRONTATION	7.95	3.79
Lothlorien	213	CONFRONTATION SCEN	5.95	2.99
Lothlorien	214	SPECIAL OPERATION	5.95	2.99
Micro User	215	OLYMPICS	5.95	2.99
Micromega	216	CODE NAME MAT	6.95	3.29
Alligata	296	SON OF BLAGGER	5.95	3.79
PSS	254	LES FLICS	6.95	4.99
Silversoft	297	TROUBLE BREWING	5.95	3.99
Thor	298	GIANT'S REVENGE	6.95	4.99
ZX81				
Quicksilva	133	QS INVADERS	3.95	2.19
Quicksilva	134	QS SCRAMBLE	3.95	2.19
Romik	135	BANK ROBBER	4.99	2.49
Romik	136	GALAXY JAILBREAK	4.99	2.49
AMSTRAD				
Micro Power	137	GHOULS	6.95	4.19
Terminal	138	STAR COMMANDO	8.95	4.19
Interceptor	271	FOREST AT WORLD'S END	6.00	3.29
Alligata	274	BLAGGER	7.95	3.79
Amsoft	275	ATOM SMASHER	8.95	4.95
Amsoft	276	HUNTER VILLAN	8.95	4.95
ATARI				
Quicksilva	345	MAGIC WINDOW	8.95	4.99

☎ 01 446 5648

PHILIPS & PHILIPS CO LTD

Guarantee

NEW TITLES ARRIVING DAILY – send for free brochure



PRIORITY ORDER FORM

SOFTWARE
Please rush to me:
FREE 'descriptive' catalogue (please tick) YES ☐

Computer make and model ____________

The following titles: (Quote item number)

Item No.	*Unit Price*	*Quantity*	*Total*
		TOTAL	

Postage and Packing FREE with orders over £10. Orders under £10 – carraige 50p per order.
Please find enclosed full remittance of ____________
Please debit my Access/Barclaycard No. ____________
Signature ____________
Address ____________
Tel No. ____________

PHILIPS & PHILIPS CO LTD Scriptomatic House, Torrington Park, Finchley, London N12 9QU

UPDATE

FIRST YOU RELEASE a good version of your game on say the CBM-64 to get rave reviews then you produce third rate conversions for other machines relying on lazy journalists not to even open the packaging before repeating what they wrote about the original. A monstrous libel on all concerned so here's an update on when you can expect to see other peopel's hits on your micro. Firebird has its **Gyron** team writing Z-80 **Elite** up in Edinburgh. Expect Spectrum **Elite** in September and Amstrad in October. Rumours abound that Firebird was so impressed with the shaver — sorry, Acornsoft that it wants to buy the company for a million pounds — but will they have enough credits left to buy a military laser? Meanwhile Elite — as in the software house not the game — hopes to produce Spec 'n Am versions of Commodore's **International Soccer/Basketball** soon. Beyond is stressing that its Spec version of **Spy vs Spy** "features identical graphics to the Commodore". End of August sees Mirrorsoft's **Boulderdash** on Am. A&F's **Chuckie Egg II,** originally Spec, is moving through CBM-64 and Am onto other micros. Another sequel, Task Set's **Super Pipeline II** is going Spec. CRL who proudly call themselves the Dream Makers have made it to the Amstrad with **Rocky Horror.**

RUSS ABBOTT has been seized by the BBC and the only way that Basildon Bond and the rest of the Madhouse team can rescue him is by getting jokes right to unlock the doors in Probe Software's new View to a Kill lampoon . . . Rupert and the Toymakers' Party paves the way for Quicksilva to follow up with The Flintstones and Max Headroom . . . 666 Go to Hell now has a rival in Witchswift from English Software while Five Ways Software wants to unleash a plague of Rats . . . Monster Trivia tests you on 2,000 Trivial Pursuits type questions . . . Nick Faldo Golf from Mind Games is icon driven . . . Dinamic in Spain wanted to call its Frank Bruno Boxing rival Rocky but has had to settle for Rocco . . . System 3's Karate will join combat with Fist and U.S. Gold's Karateka.

ON YER BIKE

Activision's Tour de force

GREG FISCHBACH brought his family over from California to Britain for the Summer. They're still looking for it.

Greg, International President of Activision, is also looking for a new U.K. chief now that Geoff Heath has left for Melbourne House.

Greg's links in the entertainment industry — he has managed the Steve Miller Band amongst others — helped him snaffle the rights to Ghostbusters which contributed to Activision's $27 million game sales last year.

Now he gets an early glance at movie scripts but he doesn't believe "that every motion pictures is capable of being turned into home comuter software. What a game needs is hooks."

His next releae is Tour de France by Byron Turner, a cycling game endoresed by the Tour, Peugeot and king of the mountains Robert Miller. Flying Scot Bob might not be so happy if he knew Greg referred to him as "the English bicyclist".



Activision stays with racing but moves over to four wheels with the Great American Cross Country Race which starts on the 64 and moves to the Atari. Moving the other way is the long-awaited CBM-64 version of Rescue on Fractalus — out August.

SON OF BLUE MAX MEETS GOONIES



Frankie's manager takes control.

SO BIG has the U.S. Gold/Ocean/Centresoft combine become that it seriously discussed taking over Sinclair when Sir Clive hit trouble. With over a quarter of the games sold in this country coming from the group already plans are in hand for a massive Autumn offensive to take more of the market. U.S. Gold will be launching sequels to proven hits — Beachhead II, Blue Max 2001 and Solo Flight II in August and Pole Position II in October — all on the 64 to start with.

Goonies — based on the Spielberg film just released in America and tipped as the next Ghostbusters — is also due in October, with Zorro due the month before. Raid Over Moscow on Amstrad paves the way for CPC versions of Dambusters and Bruce Lee later. Ocean is happy with the live audio track of Relax on its Frankie Goes to Hollywood program for the 64 and Spectrum and now plans Atari and Amstrad versions.

Ocean has also signed up Japanese computer game wizards Konami — who produced the original Scramble back in '81 — to sell Konami titles under the Imagine name.

The first of these is Hyper Sports — a suitable name for the original Imagine operation before it was resuscitated by the U.S. Gold/Ocean/Centresoft combine. Next Konami/Imagine launch will be Yie Ar-Kung Fu which will find itself competing with U.S. Gold's Karateka in the martial arts battle.

POP★ TOPS

TOP 20

1	Shadow Fire	Beyond	Sp/64
2	Dun Durach	Gargoyle	Sp
3	Dont buy this	Firebird	Sp
4	Booty	Firebird	Sp
5	Softaid	Etheopia Appeal	Sp
6	Grand National	Elite	Sp
7	World Series Baseball	Imagine	Sp
8	Herberts Dummy Run	Microgen	Sp
9	Quackshot	Creative Sparks	Sp
10	Dambusters	US Gold	64
11	Starion	Melbourne House	Sp
12	Arnhem	CCS	Sp
13	Wild Bunch	Firebird	Sp
14	Star Strike	Realtime	Sp
15	Rocky Horror Show	CRL	Sp
16	Everyones a Wally	Microgen	Sp
17	Broadstreets	Argus	Sp
18	Dragontorc	Hewson	Sp
19	Gremlins	Adventure Int	Sp
20	Death Star Interceptor	System 3	Sp

Sp = Spectrum 64 = CBM 64.
Source = WH Smiths.

TOP 3 BY MACHINE

1	R.I.P.	M. Tronic	Vc
2	Rockman	M. Tronic	Vc
3	Mickey the Brickey	Firebird	Vc
1	Way of Exploding First	Melbourne House	64
2	Drop Zone	Centresoft	64
3	A View to Kill	Domark	64
1	A View to Kill	Domark	Sp
2	Dun Darach	Gargoyle	Sp
3	Action Biker	M. Tronic	Sp
1	Overdrive	Superior	El
2	Classic Adventure	Melbourne House	El
3	Football Manager	Addictive	El
1	Alien 8	Ultimate	Am
2	Ghostbusters	Activision	Am
3	Fighter Pilot	Digital Ing.	Am
1	Ghostbusters	Activision	Ms
2	Flight Path	Anirog	Ms
3	Chuckie Egg	A & F	Ms
1	Atik Atak	Ultimate	Bc
2	Revs	Acorn	Bc
3	Lode Runner	S. Projects	Bc
1	Quasimodo	C. Soft	At
2	Ghostbusters	Activision	At
3	Fort Apocalypse	US Gold	At
1	Dorks Dilemma	Gremlin	16
2	Dark Tower	Melbourne House	16
3	BMX Racers	M. Tronics	16

Vc = Vic 20 64 = CBM 64
Sp = Spectrum Bc = BBC At = Atari
16 = CBM 16 El = Electron
Am = Amstrad Ms = MSX.
Source = Websters Software.

YOUR Letters



Your Computer now has its own Prestel Mailbox. Our number is 019991800. If you have any program enquiries send us a message. We will try and give you an answer within a few days.

WHY NOT BACK—UP?

I FELT COMPELLED to write to you after reading your News item entitled "Don't touch — Software industry at risk" in the July '85 issue of *Your Computer*. This article referred in particular to Evesham Micro's Interface 3 which from what I can gather allows all commercially available Spectrum software to be transferred to Microdrive but it's implications were applicable to every back-up utility released for any micro.

I appreciate the concern felt within the software industry for the sort of organised software piracy rampant today but the opinions expresed in the article seemed to me to be just a touch one sided. Especially the comment by Mr. Langdell of the Guild of Software Houses who believes that there is no such thing as an "innocent" copy. Is he categorically stating that when I transfer my tape based programs to disc for more convenient use I am guilty of a crime? That's what it sounds like to me! I find his comments not only ill-informed, but also deeply offensive.

Cassette tape is an inefficient medium for storing computer data, it is slow and unreliable, and despite Mr. Langdell's protestations to the contrary, subject to deterioration with time. Unless you are prepared to fast-forward and rewind your tapes every few weeks as a matter of routine, print-through (caused by long-term proximity of data on the closely wound tape) may produce data corruption, thus rendering the tape useless.

I am not suggesting that this will happen inevitably, but it is a very real risk, particularly with so-called "fast loaders" where the frequency of bits is so much higher, and the computer is pushed just that little bit further to read the tape. It is perhaps lamentable that even in 1985, the vast majority of UK home computer users still rely on tape for software and data storage, and now that alternative storage media is beginning to gain wider usage in this country it seems that there are people wishing to prevent us from making full use of them, for until disc (and Microdrive) based commercial software becomes the norm it will still be necessary for the serious home user to back his/her tapes up on to disc.

You may well condemn the producers of back-up utilities but if I might just present an analogy: If I were to buy Paraquat from a gardening supplier's shop and subsequently used it to murder my mother-in-law, would the shopkeeper be guilty of my crime? Certainly not! Back-up utilities in this era of elaborately protected software are an essential commodity. It is not the manufacturer of these utilities at fault, rather it is a small minority of ill-principled individuals who put them to perverted use, giving the rest of us a bad name.

May I ask how the Computer Copyright Bill, once law, is going to be policed? Will my name go onto a police computer (possibly backed up onto the odd disc or two . . . tut tut!) as a known computer addict and will I then have to live in perpetual fear of midnight raids by the crack Hack Squad?

I'm afraid that no amount of irrational pontificating is going to prevent me from making as many back ups of software as I wish. It's for my own use, I don't compute for profit, I do it for my own pleasure. I am not a criminal. Possibly Mr. Langdell would like to see the manufacturers of fast mass storage devices go out of business instead.

Rob Baxter,
Manchester,



NEW ROUTINES

SPECTRUM OWNERS may like to use some of my routines.

POKE 23659,0

Makes the Spectrum crash if anything is printed in bottom part of the screen. e.g. error messages or breaks. (To disenable this routine use POKE 23659,2)

PRINT USR 0

Completely clears the memory. (New only clears the Basic)

```
9000 FOR f=1 to LEN a$:PRINT A$(f);:BEEP .05,0:NEXT f:RETURN
```

Prints text newsflash style. It is meant to be used as a sub routine. To activate use LET a$="message to be printed.", then set the printing variables e.g.

PRINT AT x,y;
and GOSUB 9000

I have noticed that the Spectrum has a facility to convert binary numbers to decimal but it doesn't have anything to convert decimal numbers to binary, so I have written a routine to serve this purpose. Poke the decimal number that you want to convert into location 16384, then run this routine:

```
1 LET a$="":FOR f=0 to 7:LET a$=a$+STR$(POINT(f,175)):NEXT f:PRINT a$:STOP
```

Neil Braganza,
Nailsea,
Avon.

DISMON

IN THE June issue of *Your Computer* you published a program and accompanying article about my Dismon machine code monitor. Unfortunately, you accidentally left out quite a large section, describing the 'E', 'F' and 'G' commands.

E ssss: Allows you to Enter Ascii

(continued on page 21)

IN ★ TOUCH

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

Message service

You can get messages to us in two ways. Either use the Prestel Telex Link to 892084 BISPRES G or you can use our very own modem, day or night on 01-661 8978. The modem is V21, 300 baud, even parity, 10 bits per character. You simply transmit in upper case "YRC" — our address code, and wait for the acceptance code "+ + + STF GO". Then off you go. Don't forget to tell us who it's for. Sign off with "NNNN" — again in upper case.

(continued from page 19)

text into memory from ssss onwards. Ascii text and control characters are entered from the keyboard — delete removes the last character, replacing it with a zero byte. This mode is terminated by pressing Stop in which case it displays the address of the next character that would have been entered, for use when appending.

F ssss eeee bb bb ......: This finds all occurences of the one to seven bytes specified, within the given address range. Any byte can be ignored by typing ** in place of the byte value. The bytes may also be specified as the Ascii value of a character by preceding the character with an apostrophe.

F ssss eeee bb bb bb — bb bb bb: This form of the Find command allows you to search for the given sequence of bytes and replace every occurence with the second sequence. As in the first form, a byte specified as ** will leave the original contents of the memory intact.

Note — The address of all matches found is printed out. If there are many occurences then the find can be prematurely terminated by the Stop key. For example:

F 1000 17FF A9 'N 20 ** 18 — ** ** 4C ** 19

This finds all occurences of loading the accumulator with the Ascii of N followed by a JSR to the $18th page and replaces them with JMP's to the same relative position in the $19th page.

G ssss: Start executing machine code at location ssss.

G: Start executing m/c at location specified by the program counter.

On entry, by any method, to Dismon it saves the IRQ vector, NMI vector, Progam counter, Stack pointer, Accumulator, X register, Y register and Status register. When Going to m/c it replaces all the above registers and starts execution at the specified location. Dismon automatically redirects the NMIV to point to itself allowing you to break out of a program and re-enter Dismon by pressing Restore. If desired, this break function can be disabled by

GN ssss and GN: Both having the same function as above. On encountering a BRK instruction during execution of a machine code program, the computer returns control to Dismon therefore BRK instructions may be inserted within a routine you are checking to help with debugging.

John Twiddy,
Wallsend,
Tyne and Wear.

YOUR Letters

ENTERPRISING

AT THE BEGINNING of March I took delivery of an Enterprise. It had taken only 10 days from the date I sent the cheque, to the day it arrived by Securicor which I don't consider to be bad going.

Before I ordered it from Zappo Computers. I had read your review of the machine which said the keyboard was poor. I had used a QL a few times and thought that the Enterprise's keyboard would be similar. It seems I was wrong, and I find it much better than the offering from Sinclair.

The graphics are superb — 640 x 512 — and although there are "only" pre-defined colours, one can define thousands using the RGB command which mixes the three primary colours.

The Basic is really outstanding, with no need to use the Poke statement. Many systems variables can be altered by using their names. For example the delay before any auto-repeat can be changed with the following.

SET KEY DELAY X — where x is the delay

The arithmetic is very accurate, with 10 digits accuracy. Try this small program on any machine.

```
10 LET C=9.8
20 LET C=C+0.00001
30 PRINT C
40 IF C=10 THEN GOTO 60
50 GOTO 20
60 END.
```

Richard Hudson,
Keighley,
West Yorkshire.

TO THE TOP

THE SPECTRUM To The Top program published in the July issue of *Your Computer* will work on any Spectrum, not just the 48k Spectrum as stated.

The game should work as listed, but readers may obtain a copy of the program on cassette by sending a cheque/postal order for £2.50 to: Mr J.R.E. Wood 22 Denver Hill, Downham Market, Norfolk PE38 9BE.

'PLUS 4 HAS MANY PLUS POINTS'



AFTER READING the review of the C128 in the June issue, I would like to make some comments about the Plus 4:

If the Plus 4 is not selling well the press is at least partly responsible. It has a good Basic which is a considerable improvement over Basic 2.0, yet straight Basic 2.0 programs will run quite happily, (with a few minor changes for colour etc.) I have run programs written for the Vic on a Plus 4, with a Screen Window to suit the Vic display.

Basic programs for the C64 run with no problems. The 1541 drive works satisfactorily with the Plus 4, transfering software is no trouble. The built-in software is adequate for many applications.

The sound and graphics commands are simple. The Plus 4 has a lot of potential for many users, including small businesses. Obviously the C128 will be an improvement but why knock the Plus 4, it's a good machine and available now.

D.E.F. Rolfe,
Byfleet,
Surrey.

BITS 'N' BOBS

K.R. Laslett's Amstrad Backup only handles programs with a Basic header. To extend its range to cope with machine code only files change line 170 to read:

```
170 DATA &A8, &22, &F3, &03, &2A,
    &EC, &03, &ED
```

Although the Backboogie article in the July issue claims that listing 2 automatically saves the code in listing 3 once it is entered, in fact it does not do so. When you have finished entering the hex code from listing 3 you must save it yourself with:

```
SAVE "BOOGIE" CODE 60148,150
```

The Load and Save commands for Spectrum Multi-Font in the June issue need to be changed before the program will work. After running listing 2 save the code it creates with:

```
SAVE "M.F.T. Code" CODE 60928,2355
```

Now to load it back change the second statement in line 10, listing 1, to read

```
LOAD "" CODE 30464
```

HARDWARE hitlist

ADD-ON EXTRA

Prospect

Modem
£143.75
Interlekt Elec
A multi rate, multi standard modem, 1200/75 300 and 1200 answer or originate modes. Connects via a standard 25 pin RS232 connector. Five LEDs on the front show when the modem is powered up, on line, receiving or transmitting data. It has a loop back test mode.

Speech Synthesizer

Commodore
£24.95
Cheetah
Difficult as it may be to think of anything more irritating than a computer announcing in a loud voice that you've got it wrong, the Cheetah Sweet Talker plugs into the user port and a din plug goes into the video output socket. It has a vocabulary of 63 allaphones (speech building blocks) and various pause lengths.

Centronics interface

Commodore
£42.50
Zero Electronics
Yet another Centronics interface for the range of Commodore computers. A bit pricey, but it does plug into the serial port, and have its software in Rom, so it should be compatible with all Commodore software. Versions for most printers, screen dump software, optional 16k buffer at £14.95. Tel 0493 842023.

Control interface

Various
£100
Bowthorpe Microsystems
Do you feel inadequate whenever people say "very clever old boy, but what can you actually do with it".? Well now you can satisfy your craving to control the central heating, the burglar alarm and the cat flap all at once with this controller.

The board gives you 12 digital and eight analogue ins and 16 digital outs.

Pace modem

- *BBC*
- *Pace Electronics*

BUYING A MODEM is always a tricky task. You have to be confident that what you buy is going to be flexible enough to allow you to keep up in the ever-changing world of micro communications. Prestel, Bulletin Boards and of course Telsoft.

Pace might just have a product here which is just what you are looking for. The modem itself fits under the phone, which plugs into the back of the modem, and the modem is plugged in via a modular style BT socket. Two push buttons on the front select either 1200/75 or 300 baud originate or receive modes. An RS-423 lead plugs into the back of the Beeb and there are two indicator lights. One doubles as power indicator and data, the other shows line hold.

So far so good, not much to get excited about here. But the real strength of this package lies in the software. Commstar comes on Rom and is one of the best terminal packages around. It has two separate modes, a spooling dumb terminal mode, suitable for Bulletin boards and a page orientated mode for Prestel.

Using the terminal mode, the first thing to do is initialise the system to conform to the board's protocols you are trying to access.

You can also decide whether you want characters echoed to the screen, spooled to a buffer — memory or disc



Pace modem.

— output to the printer. If you are using a printer, it may be necessary to use XON/XOFF protocols to prevent jamming as the printer gets busy. There is a buffer output mode so that messages can be prepared off line.

The Prestel mode is a little more limited. There is no printer driver included, you can use various off the shelf printer drivers. To help cope with Prestel, you can tag as many pages as you want, and then retrieve them in the order you tagged them. All the usual options such as previous page, repeat page and download program are available from the function keys.

If one were to try and pick one small fault, it is that there is no Prestel message buffer, so mailboxes have to be typed in on line. Short phrases, such as password and ID can be programmed into the function keys, but this isn't really adequate for messages.

Apart from its reliability, it hasn't crashed on me yet, its very user friendly. From the menu page, you can enter any 'star' command you like, so you can mess around with disc files and printer format, and then return to Commstar. You can even stay on line while you do it!

Further enhancements to the Modem include an auto-answer board which should be available by now, and a bulletin board disc, using the SBBS format.

Voice Master

- *CBM-64*
- *Anirog*
- *£59.95*

THE VOICEMASTER is a rather insubstantial lump of aluminium which converts your dulcet tones into a pattern of frequency against time. This it stores away inside the Commodore's memory. The box simply plugs into the joystick port. You can record a vocabulary of words which you can then incorporate into your programs.

You can train your Commodore to recognise a vocabulary of 32 words, or, if you hum it, the Voicemaster will play it, even correcting it if your singing is, shall we say, less than perfect. The quality of speech depends on the sampling rate. The faster the rate, the better the quality, but the greater the memory required.

Generally, the words will be recognisable, but from the Donald Duck school of diction. The speed of playback can be varied, and the Voicemaster need not be connected during playback, it uses the SID chip. After a couple of training sessions, the recognition program will achieve a hit rate around



Anirog voice master.

80 per cent, once you're used to it. Voice control of games might be tricky, as trying to retain measured tones in a crisis might be difficult, but it might make computers more accessible to the beginner.

The hum-along program is amusing. It records a single melody line which you hum into the mike. This is displayed on a musical stave which can then be easily edited, printed out, saved and played back in any of the 10 preset voices available. It is a pity only one melody line can be recorded.

This is a fascinating add-on which will give hours of fun. A serious use for it might be harder to come by. It is a cheap method of incorporating speech into games. For someone interested in computer music, a true digital sampler with more specialist software is necessary.

That said, it brings into the province of the home user a field of interest formerly reserved to those with a few thousand pounds to play with.



HEALTH WARNING: BOUNTY BOB CAN SERIOUSLY DAMAGE YOUR SANITY!

Star chart

KEY

★ ★ ★ ★ ★ Best of its type
★ ★ ★ ★ Very good
★ ★ ★ Good
★ ★ Average
★ Below par

Bobby Charlton Soccer

BBC
DACC
Football simulation
£11.95

★ ★

It's a great idea — match-action graphics teamed up with football strategy. Unfortunately, the graphics in the DACC game aren't as good as Commodore International Soccer's or Ocean's Match Day's, and the strategy aspect isn't as compulsive as Football Manager.

First you pick the team formation and then distribute 99 skill, accuracy and stamina points to the players. You can also hand out instructions on positional play to individual team members.

Tim Love's Cricket

CBM-64
Peaksoft
Cricket Simulation
£8.95

★ ★

Every winter cricket fans cluster around radios like Ovaltine kids, listening to crackly broadcasts from the furthest corners of the Empire ... sorry, Commonwealth. England are nearly always in dire trouble, and prayers are offered to the great umpire in the sky, for a great summer of revenge back in the old country. Summer comes and with it rain. Still not to worry, now you can play cricket in the comfort of your living room.

Tim Love's Cricket may become to cricket buffs what Football Manager is to soccer fans. It takes about as long to play, and has many similar elements. However, where Football Manager is primarily a strategic "think'em-up", this is more an arcade game.

"Flawed but fun" sums up this game perfectly.

SOFTWARE Shortlist

Way of the Exploding Fist

- *CBM 64*
- *Melbourne House*
- *Arcade*
- *£9.95*

★ ★ ★ ★ ★

THUCK! A high punch renders my opponent senseless. GRUNCH! Just as I square back up to him his roundhouse kick catches me unawares sending me sprawling. Melbourne House's Fist is the most realistic and enjoyable computer combat game yet. Even the tired and cynical hacks of the *Your Computer* office were queuing up to play it.

You have a choice of 18 different blows, jumps, blocks and kicks all controlled from the joystick — it sounds complicated yet the movements seem surprisingly natural and easily learnt. Against the computer-controlled karate kid waiting for it to strike then pulling its legs away with a forward sweep will take you a long way. But the game really comes into its own played between two human players.

There you need the full range of punches and kicks. A perfectly executed flying kick will bring you 1,000 points signalled by a Yin and Yang symbol awarded by the fan-toting judge but leaves you vulnerable to a whole range of counters. The sweeps along the ground which prove so effective against the computer can be smashed with a well-timed short jab kick.

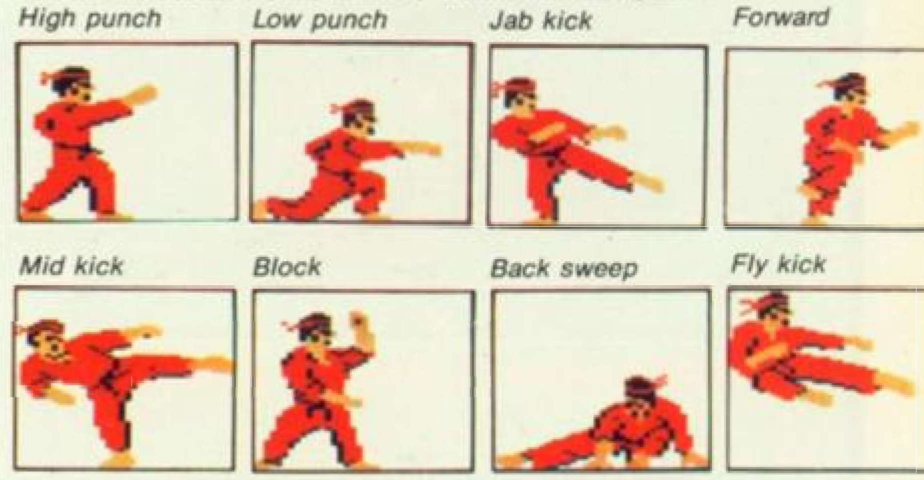
Each blow that strikes home is signalled with a grunt of pain breaking in to the tinkling oriental music sound track as the victim doubles up. As you improve you need to use the forward and back somersaults to keep out of trouble and take your opponent by surprise. Each fight is played out in front of four background screens, a pagoda, lake and mountains, in a gymnasium and in front of a Buddha. Against the computer you have to twice defeat a novice at the pagoda, a 1st Dan at the lake and mountains, and progressively more difficult opponennts at each location.

Between the 3rd and 4th, and 7th and 8th Dans the program springs a surprise on you, which you can deal with by remembering the name of the game.

If this all sounds a little violent to you — at least everyone lives to fight another day and the only real hazard is flailing elbows as you and your opponent wrestle with the joysticks.



Way of the Exploding Fist.



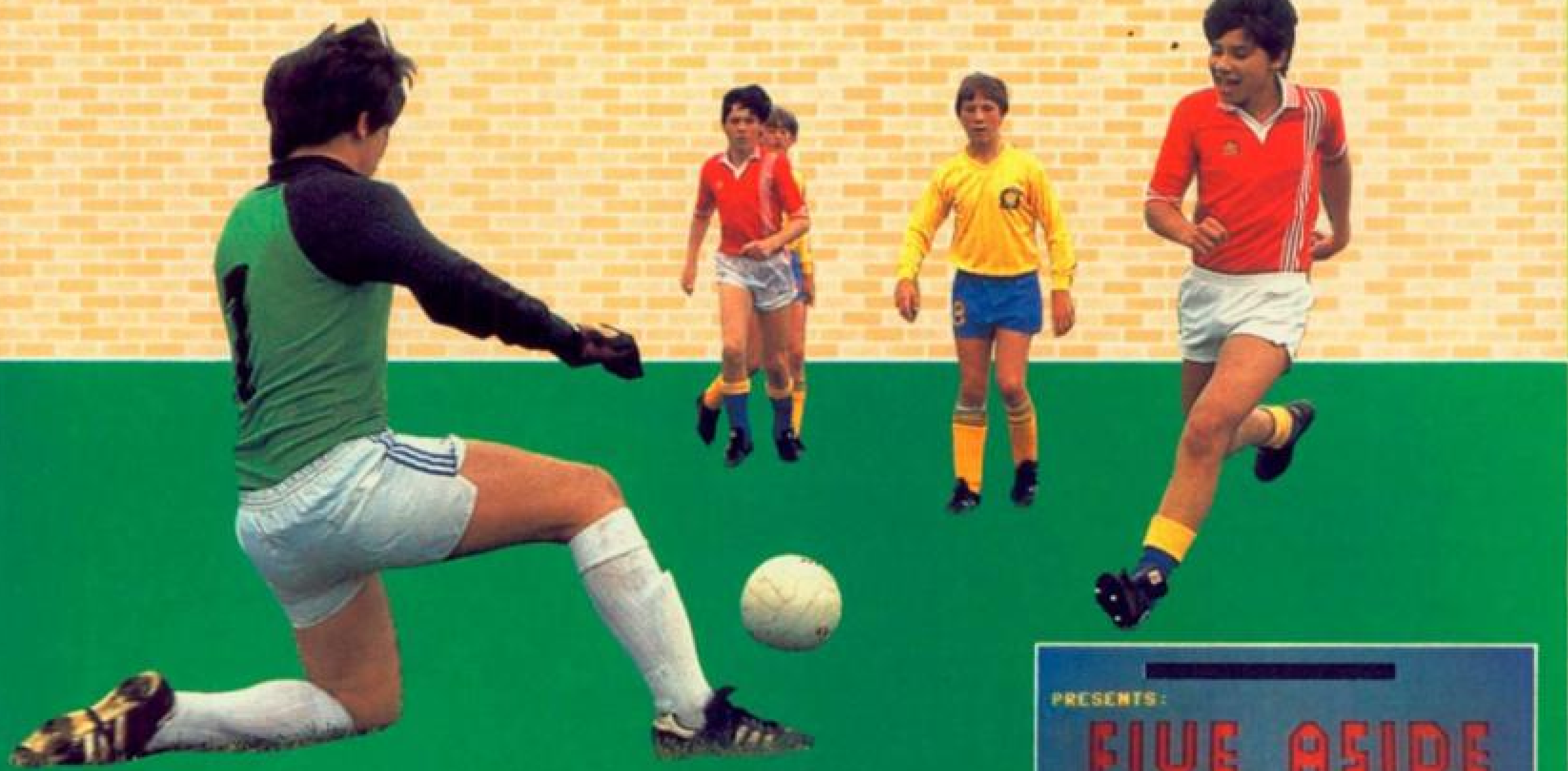
. . . BEHIND THE SCREENS . . . BEHIND THE SCREENS . . .

KARATE was the "only arcade game I played that I thought would be ideal on a home computer" says programmer Gregg Barnett. He put the idea to Melbourne House chief Fred Milgrom this January and "Fred jumped at the idea". Together with two other programmers and musician Greg Holland, Gregg Barnett has been slaving away in the software house's Melbourne bunker ever since. First he designed graphics handling routines to control the tall 72-pixel high figures on screen. Each player is made up of nine sprites which allowing for all the different shapes generated by 18 different moves makes a memory-sapping sprite count of 740. Fist was developed on BBCs with fast disc access linked to Commodore 64s. On the Commodore says Gregg "it can take up to three hours assembly time if you make a mistake compared with five minutes on the BBC." "Making the computer play an intelligent game" was the most difficult part of Gregg's job so he had to look for volunteers to take it on. "But this time there were too many takers. That's when we knew it was going to work." With sound and backgrounds as well cramming everything into the 64's memory was difficult. Holland's music alone took up 3K and the interrupt-driven sound effects — grunts, shouts, moans and a primal scream based on digitised real sounds, extracted at who knows what price from the Melbourne House staff — another 3K. Gregg worked on Commodore versions of Horace, The Hobbit and Sherlock Holmes so he knows how development teams can become bored with a program. "Normally when the game's out everyone's sick of it" but this time they carried on playing Fist.


Fist writer Gregg Barnett.

Meirion Jones

FIVE-A-SIDE FOOTBALL







Penalty shoot out feature



Fast moving characters leave competition standing.

Ideal family entertainment.

Voice Master generated speech.

Exciting simulation for **one** or **two** players.



Amazingly realistic animation.

Speed and skill the essence of the game.

Ingenious method of settling arguments.

Demanding challenge at all three skill levels.

Enormous fun from start to finish.

CBM 64
64 Cassette £5.95
64 Disk £8.95

ANIROG

TRADE ENQUIRIES: ANIROG SOFTWARE LTD. UNIT 10 VICTORIA INDUSTRIAL PARK VICTORIA ROAD DARTFORD KENT (0322) 92513/8

Star chart

Dork's Dilemma

C-16
Gremlin Graphics
Maze game
£6.95

★ ★ ★

Slightly unusual in that the aliens try to trap you rather than kill you, though if you bump into them at any speed you've had your chips.

The graphics are all you would expect of the C-16 and the game is tactically interesting as you plant a time bomb and must be able to escape. Once you've killed all the aliens a piece of your craft is transferred out of the force field in the screen centre.

Saimazoom

QL and Spectrum
Silversoft
Maze game
£7.95

★ ★ ★

Ultimate Play The Game have really spoilt software reviewers. I might have raved about this game once. As it is, it goes down as competent and enjoyable.

You steer your figure, Indiana Smith, around the jungle collecting items which permit you to ford rivers, shoot hostiles and carve through rockpiles and you must collect water bottles.

Pipeline

Spectrum
Viper
Archetypal
£7.95

★ ★ ★ ★

The ideal game for paranoid DIY plumbers in an excellent implementation by Simon Ffinch — with acknowledgements to Taskset.

The pipes in this game have a good solid Victorian quality about them, and the plumber and his mate have a tough time fighting off the saboteur and the aggressive ladybirds.

Eight screens and you can choose your own keys, or use a variety of joysticks. And with another game — SOS — on the flipside, it's really good value for money.

SOFTWARE Shortlist

(continued from page 25)

Kennedy Approach

- *CBM-64*
- *US Gold*
- *Simulator*
- *£14.95*

★ ★ ★ ★

"AMERICAN ZERO zero five, turn left to bearing two seven zero, descend to two thousand feet", a crackle of static, and then "Roger" as the pilot acknowledges the order. No, this isn't the script from another turgid airport drama, but instead the new air traffic control simulator from Microprose. This game is not headed for disaster.

The speech, which is clear and understandable even down to the mid-western accent and the crackle of the radio, is all from the Commodore's own hardware. Just try that on a Sinclair!

Putting the voice synthesis to one side for the moment, how does the game play? Previous efforts at this sort of thing have suffered from a lack of playability. But, here, all the information is easy to get at and entering instructions to the pilot is simplicity itself. You move a cursor over the plane to be controlled, press the fire button and then give orders on direction and height. If you forget the orders you gave a plane, ask the pilot.

The graphics are rather primitive, showing blobs on sticks moving around a grid. But it gets the information across, which is the main thing. Five



Kennedy Approach.

locations are available, from sleepy Atlanta to hectic Kennedy. There are three different aircraft types, Cessnas, jets and Concordes, which all go at different speeds, important when working out where various planes are going to be in a few minutes time.

During a really busy shift, you have to keep an eye on more than a dozen planes at once, landing, taking off and flying to various destinations. If this still sounds too easy, then the computer will throw a few storms and emergencies your way as well.

After your fifth mid-air collision over New York in the rush hour, you'll be glad you weren't flying in to America shortly after Reagan did the big shift change with his Air Traffic Controllers.

Lee Paddon.

Jump Jet

- *CBM-64*
- *Anirog*
- *Flight Emulator*
- *£9.95*

★ ★ ★

YOUR CHANCE to slip the surly bonds of earth with a V/STOL Sea Harrier — you don't need a ramp to get off because this program's plane has been specially modified to carry only 5,000 lbs of fuel and four missiles. Little details like this add credence to the program, if being written by ex-jump-jet pilot Vaughan Dow didn't already give it enough. (Some killjoys usually take this opportunity to point out that some really bad flight simulators have been written by pilots.)

With speech synthesis and introductory music this program has enough of the polish needed for it to be able to hold its head up in today's software market. But I don't think flight simulator afficionadoes and purists will rave about it — it's more of an advanced shoot'em-up than a pure simulator. Nevertheless, the instruments are visible throughout the program action, faithfully reproducing what's going on.

On the first screen, the top half shows an overhead view of the aircraft carrier with the instrument panel shown in the bottom half.

To take off you must hit the F key to select flaps down, switch on the vertical thrust — key 3 — and increase the power to maximum by pressing the



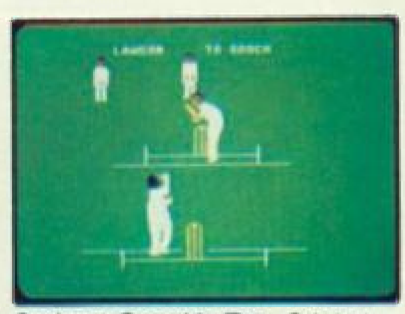
Jump Jet.

+ key. By selecting thrust at 45 degrees the aircraft can be boosted to normal flying speed. Don't forget to raise the undercarriage and flaps before exceeding 300 knots otherwise the computer will get panicky and shout at you. If the jump-jet is flown higher than 200 feet or out of range of the split screen display, the display shows the sea and the sky and the relative positions of the carrier and enemy aircraft are shown on the radar.

You achieve promotion by keeping the number of warnings down to the minimum permitted for your rank. So a Group Captain can only get away with three computer admonishments, whereas a Flight Lieutenant is allowed nine. A reverse example of what is meant by rank having its privileges. When the enemy aircraft attack you select M to activate the aiming sight and arm the missiles.

The higher you fly, the more difficult it gets — as you progress through the ranks, variable and deteriorating weather conditions make life more difficult.

Paul Bond.



Graham Gooch's Test Cricket.

Graham Gooch's Test Cricket

- *CBM-64*
- *Audiogenic*
- *Simulation*
- *£9.95*

★ ★

REMEMBER the Great Egg Race, all that hype and in the end all you did was sit back and look at it? Well, here we go again. Once the game has loaded, apart from changing the bowlers every now and then, you are free to get on with those other important tasks in life like making coffee and putting the cat out.

The screen gives a Ritchie Benaud eye view of the crease, as the bowler moves up to the wicket and bowls. The ball moves as realistically as the chunky graphics will allow, and the batsman takes a swipe at it. If he connects, you switch to another graphics screen of a

(continued on page 29)



Every pilot has the dream of flying one of these unique and complex fighting machines. Here is your chance to do what few pilots have the privilege to try.



Depending on your skill, confidence and courage, you have the choice of remaining near the landing pad, learning to hover and land, or venturing higher to practise your approaches.

When you think you have mastered these, then accelerate the Jump Jet into an attack fighter. Use the radar and range finder to seek and destroy the enemy, by launching heat-seeking air-to-air missiles. Beware! His radar and missile systems are as good as yours. Reckless pursuit is ill-advised: you must maintain a fuel level that will enable you to relocate and return to the aircraft carrier, executing the skills you have learned to achieve a successful landing.



You are now ready to proceed to the next skill level to face additional hazards, such as unpredictable swell and treacherous cross-winds.

Be warned, this program is not a toy or game. You will need to co-ordinate your hands, eyes and mind to successfully complete each mission. Do not hope to achieve in a short time that which took the author three years to learn as a Jump Jet pilot, and over a year to record on this computer program.

ANIROG

TRADE ENQUIRIES: ANIROG SOFTWARE LTD UNIT 10 VICTORIA INDUSTRIAL PARK VICTORIA ROAD DARTFORD KENT (0322) 92513/8

Mail Order: 8 HIGH STREET HORLEY SURREY 24 HOUR CREDIT SALES HORLEY 02934 6083 Payment by: P.O. - ACCESS - VISA

Star★chart

Ancient Quests

QL and Spectrum
Mirrorsoft
Maze game
£7.95
★★

Two games for the price of one is the growing trend for sensibly-priced good value software. I'm not wild about this example from the normally sound Mirrorsoft label, however.

The games run perilously close to passing off arcade games as educational software, in my opinion.

In King Tut you wander round a sub-Ultimate maze matching shapes with names and so on until you find the hidden treasure.

The other game, The Count, is set in a Dracula scenario and deals surprisingly enough with counting.

EVA

QL
Westway
Arcade adventure
£10.95
★★★

EVA, far from being the new au pair, stands for Extra-Vehicular Activity as any child of the space age will tell you. Game has overtones of Jet-Pac, and consists of 26 different screens.

You must construct a teleport device to change screen. Naturally you are under relentless attack from aliens.

Anyone bringing out software, let alone games software, for the QL should be applauded, but when all's said and done, there are games just as good on the Spectrum.

Buggy Blast

Spectrum
Firebird
Shoot'em-up
£5.95
★★★

Graphically pleasing little number from the BT software house, which has inexplicably missed being reviewed in *Your Computer.* Fly down corridors shooting at assorted robots, orbs and flying saucers.

(continued from page 27)

few fielders running about. If you feel like getting involved, there are two ways. In simulation mode, the bowler can attack off middle or leg and the batsman can decide to play more or less aggressively.

One or two players are catered for. Arcade mode is a solo effort, the bowler is controlled decathalon style, and you have to hit the batsman's fire button when you want him to play. Before loading the main game, you can define your own teams. You enter their names, bowling and batting averages, and bowler type.

For this sort of game to succeed, it must either appeal to the cricketing buff or be just another arcade game. It lacks the sort of detail the buff would want to see, and for the arcade addict, it's just too dull.

Lee Paddon.

Dun Darach

- *Spectrum*
- *Gargoyle Games*
- *Graphic Adventure*
- *£9.95*

★★★★★

JUST WHEN you think that it would be impossible to squeeze any more out of the Spectrum, along comes a game which makes you wonder where it will all end. Gargoyle Games produce graphic adventures. But that is only half the tale, because Gargoyle graphic adventures are one of the jewels in the crown of British software.

Unlike most computer adventures, which are Tolkienesque or Gothic, Dun Darach, like the earlier Tir Na Nog, is Celtic. From the unpronounceable names, to the unspeakable horrors, Dun Darach is poetically atmospheric. In our dreams we've all been to Dun Darach.

The graphics and action are exceptional. Especially wonderful is the movement of the characters. Like a number of other graphic adventures, this one uses the movie camera approach. That is you do not see out of the eyes of puppet in the computer world. Instead you view him through a camera. He can be made to walk, grab, drop, fight and offer objects to others through the keyboard — the same medium is used to control the direction which the camera is pointing in.

Cuchulainn is the name of the hero of the game. Tir Na Noggers will remember him, and his task is to free his pal, Loeg the charioteer, from the city of Dun Darach. He and the other inhabitants of the city look like rock musicians, with long flowing hair, bare arms and boots — the girls have longer hair and mini-skirts.

The city is realised wonderfully in this computer game, it is easy to get the impression that you are actually there. Taking the time to draw a map can be dangerous as the inhabitants are a bunch of thieves and pickpockets, but if you do you will be impressed by the size of it, and the attention to detail.

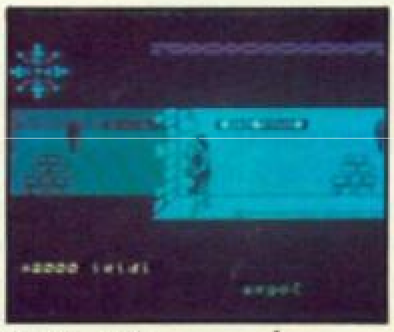
As graphic adventures go, Dun Darach is not easy. But it is highly original, superbly crafted and will give pleasure for hour after hour.

Bill Bennett.

SOFTWARE Shortlist



Herbert's Dummy Run.



Dun Darach.

Nodes of Yesod

- *Spectrum 48K*
- *Odin Computer Graphics*
- *Arcade adventure*
- *£9.95*

★★★★

THIS EVOCATIVELY named game features a home computer breakthrough — the first-ever Spectrum speech with Liverpudlian accent. But don't worry, it's only the introduction.

It bears certain similarities to Ultimate's Underwurlde, not least in the quality of production. You play a spaceman who must descend into the depths of the moon, collect eight alchiems — coloured shapes — and then get to the Monolith. All this to save the universe from some horrendous evil.

One of the game's nicest touches is that you're not alone in your quest. Before you disappear down a lunar pothole you need to catch a mole from its hole. When needed, the little crittur can be activated to chew through walls to new caverns, or to destroy the many creepy crawlies in the moon's depths.

The subterranean playing area has many platforms which you hop around on. Progress is made in a series of athletic somersaults which will often land you at the very bottom of a cave — minus a life.

Peter Connor.

Herbert's Dummy Run

- *Spectrum*
- *Mikro-Gen*
- *Arcade Adventure*
- *£9.95*

★★★★

MIKRO-GEN'S ARCADE adventures are witty in an Ealing comedy way, as opposed to the Raiders of the Lost Ark fun of Ultimate's games. Both software ranges use impressive graphics, undisclosed maps, and take time to master. Both software ranges are more expensive than the average Spectrum fodder, but as Rolls Royce will tell you nobody begrudges paying extra for quality providing they have the money.

Herbert's Dummy Run is a compendium computer game. A number of the rooms within the arcade adventure are mini arcade games in their own right. So for your money you get a lot of different games — a kind of Star Wars On 45. You have to find items that let you do things, like the tennis racquet which is used to hit the bouncing tennis ball. In this respect the game is adventuresque, but go-north, eat-food, bang-headers will turn their noses up at Herbert's babyish actions.

In fact, Herbert is a baby. Just to prove it, the game loads and starts playing "Baby Face" — if you can amplify your Spectrum's sound output it is worth doing so. He comes from a good family, being the child of Wilma and Wally Week, who you may remember from the previous Mikro-Gen games. Wally looks like a Tetley Tea man, but reminds me of Norman Wisdom.

The game is set in a department store; somehow Herbert has been separated from his mum and dad. His adventures on the way to the lost and found department are like a surreallist's nightmare, maybe he just drank too much gripe water.

Bill Bennett.

SOFTWARE Shortlist

Star★chart

Five-a-side Football

CBM-64
Anirog
Soccer game
£5.95 — disc £8.95

★ ★ ★

If this indoor football game has much of the excitment of ice hockey — and many of the same rules — you shouldn't be surprised. It was co-produced by Advantage, the same Canadian software house that brought Anirog's Slap Shot ice hockey game to the small screen. Not only do the players glide around the pitch as if they were on skates, they can also body-check each other with impunity on or off the ball. This escalation of soccer violence to the computer's screen adds a new and unexpectedly enjoyable dimension to the game. Your view of the action moves smoothly from end to end following the play, and the crowd gives a squelchy under-water roar as the ball hits the back of the net. The play switches to a penalty sequence whenever you cannon one player too many into a wall. Playing options include three levels against the computer, a penalty game plus the normal two-player.

Timeslip

C-16
English Software
Triple Scramble
£6.95

★ ★ ★

The game gives you three Scramble-type games for the price of one featuring a screen split horizontally three ways. At the top of the screen you fly a rocket over the landscape, in the centre you control a little man with a jet pack and on the bottom screen it's a submarine.

What are you trying to destroy, apart from the usual clutter of tanks, fuel dumps and civilian housing that tend to clutter up these sort of games? Well, there are 36 time orbs placed within the three time zones. Your job is to destroy all the orbs and synchronise time in the three zones to zero hours.

Sky Fox

- *CBM-64*
- *Ariolasoft*
- *Shoot'em-up*
- *£9.95 — disc £12.95*

★ ★ ★ ★

NOT SO MUCH a flight simulator as a combat simulator, Skyfox features both air and ground attack, plus a variety of scenarios. The three-dimensional graphics are very impressive, especially in the airborne scenario. But the hordes of tanks rolling across the green terrain of the charted colony are just as deadly.

You have to defend your home base and installations against attacks launched from a vast alien mothership. You can develop your skills through various training levels through to small invasions, full invasions, or would a massive onslaught be more to your taste, sir? Likewise you get promoted through five ranks from cadet to ace of the base. It is possible to start high (against planes) or low (against tanks), in a combined scenario.

The screen display shows the view from Skyfox's cockpit. There is a central radar display as well as the actual view from the cockpit and by pressing f1 you can choose an overhead or a forward view. If there is no activity in your area, you can just hit A and the autopilot will take you where the action is. As Ariolasoft's Clive Brown put it: "You don't want to be hunting all of the time — there are plenty of other programs that do that".

But, you can hunt if you want to. Alternatively you can call up your on-board computer which gives an overhead display of alien incursions and by moving your cursor on the map and pressing A you can go to the most strategicaly important area, rather than just the nearest.

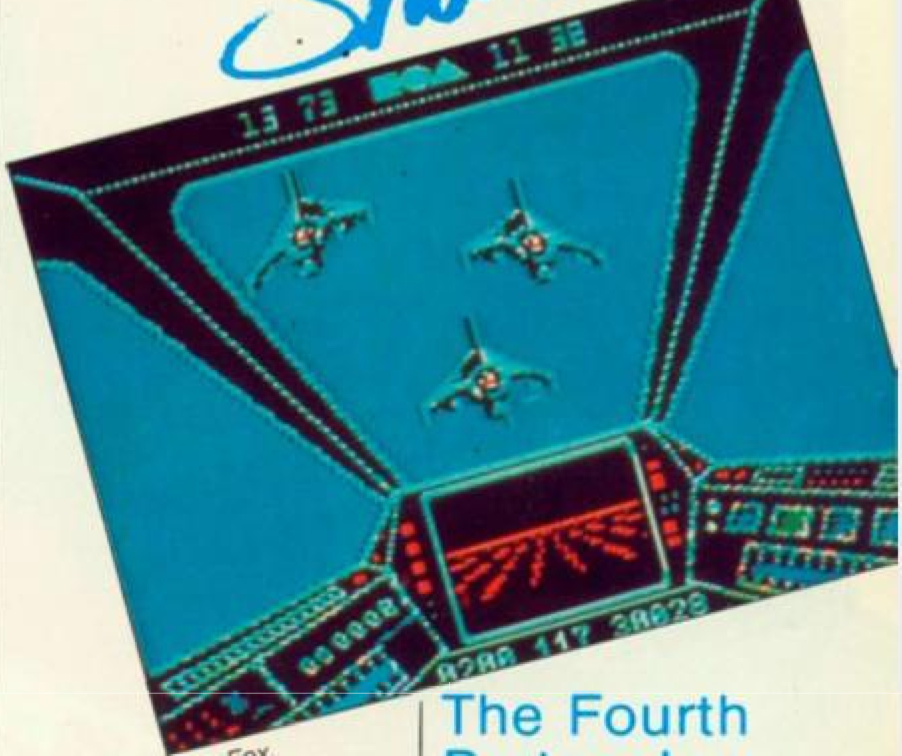
The prices certainly make Ariolasoft competitive with other quality US imports and this is a new game released within two months of its American debut. "My hope is that we will get prices down to the same level as cassette prices", says managing director Frank Brunger.

Other nice features in the game include afterburners — hit the space bar to blast yourself out of a sticky situation or to zoom in on the enemy. You can select a limited number of guided or heat-seeking missiles which wipe out your target as long as you keep it in the middle sector of your cockpit window. You can land at home base to refuel, which you'll need to do if you use the afterburners much.

There is also a set of five multiple mothership invasion scenarios, Halo, Alamo, Advancing Wall, Chess and Cornered which necessitate different kinds of threat analysis on your part.
Paul Bond.



International Tennis.



Sky Fox.

International Tennis

- *CBM-64*
- *Commodore*
- *Tennis simulation.*
- *£5.95*

★ ★ ★

Soggy strawberries, and tennis tantrums; such are the dubious pleasures of another washed out English summer, and one of its great institutions, Wimbledon. Thanks to Commodore, the sight of the rain tipping down on the centre court need no longer be a signal for tennis fans to despair, just plug-in your trusty Commodore, and get stuck in to this latest offering in Commodore's "International" series.

You get an umpire's eye view of the court, with a token bunch of blobs in the background "representing" the crowd. One or two player options are available, and four levels of computer opponent are provided. Control is via joysticks, moving the player around the court and playing the stroke.

The way you move the joystick as you hit the ball determines the sort of shot played in a fairly logical manner, i.e., pushing the joystick in the direction of your opponent plays a long straight ball, pulling the joystick toward you will produce a moderate length cross court ball.

Most shots are there — ground strokes, vollies, baseline play — but smashes and lobs are out.

Playing the game takes some getting used to. The side-on view is harder to judge than the more usual down-the-court style.

Looking at other offerings, there seems little to recommend this game over Activision's On Court Tennis.
Lee Paddon.

The Fourth Protocol

- *Spectrum*
- *Hutchinson Computer Publishing*
- *Adventure*
- *£12.95*

★ ★ ★ ★

SO YOU made it at last, Johnny. Congratulations, Bertie. This is the first phone call you take when as John Preston you take up your post as the new head of section CI(A), part of MI5 responsible for the security of government buildings. But you'd better not rest on your laurels too long.

A burglar steals some diamonds from a flat somewhere in England, but posts back to the MOD some NATO documents that he lifts by accident at the same time. Where's the leak? You'd better find out fast, or you'll end up being posted to the Falklands. Worse, a nuclear bomb may go off somewhere in the UK.

The game is divided into three sections: The Nato Documents, the Bomb and the SAS assault. You must solve the first part to get the password for the second part and so on. The game is a high resolution, predominantly monochrome icon-driven adventure. On the first screen you have representations of three VDUs, a filing cabinet, a VCR camera, a cassette (this is for utilities related to saving the game for continuation at a further date), a graph, and a date pad which can be used to advance time in the game.

You just move a pointing hand around the screen to select what you want to do. If you go through the VDU displaying memos a subset of icons is overlayed on the screen enabling you to read, file or bin documents. A dustbin icon is used for the latter function, as on the Macintosh computer.
Paul Bond.



The firing squad, from left to right, Formula 1, Arcade Turbo, PCA, Bat Handle, Champion, The Boss, 3-Way, Formula 2, Computek, The Stick, Computek and Super Champ.

JOYSTICK JURY

OF THE MAKING of many joysticks there is no end. A few years ago you took what you could get; now you're faced with a bewildering number of conflicting designs. Somehow you have to solve a complex equation involving such variables as strength, comfort, responsiveness, manufacturers' claims and, finally, the price. One of the factors affecting the last variable — price — seems to be the use of leaf switches or micro switches, the latter being more expensive as well as more responsive. Kempston's latest joysticks exemplify this difference.

In keeping with their new image as sponsors of motor sport, Kempston's sticks are now called the Formula 1 and 2. They've changed the previous black for a vibrant light blue. I think it's a disgusting colour, but de gustibus . . .

The **Formula 2** is the cheaper stick. It has two fire-buttons on the base — presumably to avoid accusations of right-handedism — and one on top of the shaft, which is quite tall and comfortably grasped. The trouble with this stick is that you have to move the shaft a long way to get the response you want. It could cost lives.

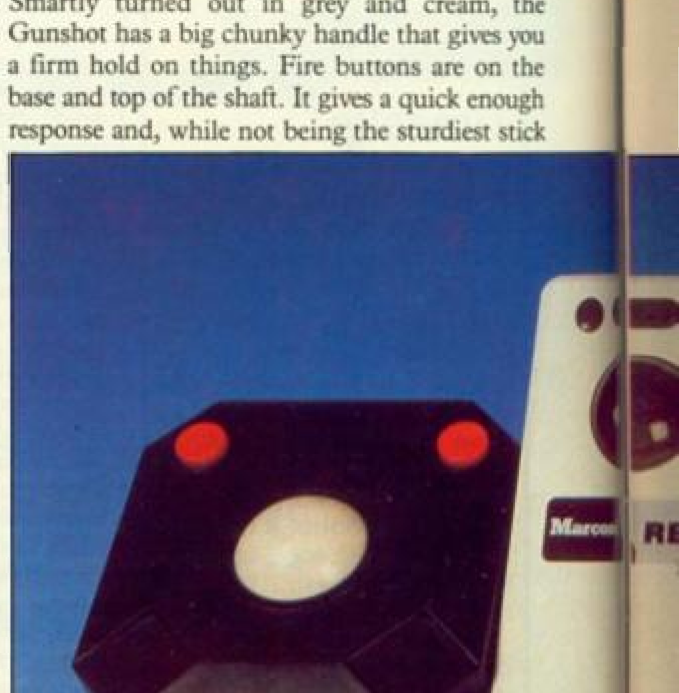
More expensive is the **Formula 1**, doubtless because it's micro switched. This makes it much more sensitive. The construction also seems to be more solid. But I found it rather uncomfortable to use. It has a very short shaft with a bulbous end. The two fire-buttons are both on the base. If you don't want to put the stick on a surface, it means wrapping your hand around the base and firing with the same hand. This caused me considerable pain in the region of the thumb.

Another company with a selection of sticks is Wico. **The Boss** is a pretty nifty stick, with a solid plastic base into which the shaft fits snugly. The single fire-button is at the top of the shaft, a location which can lead to a certain amount of fatigue. The Boss is, otherwise, very comfortable and also very responsive. Perhaps just a little too much so; at times there doesn't seem to be enough resistance and you go much further than you wanted to.

Wico's **Command Control** is a very superior joystick; solid, smooth and attractive. There's a snazzy red and black base with a steel shaft. The grip is smooth, but this didn't cause any problems. This is a very responsive joystick and should last a long time. But it's also pretty expensive.

Not quite as costly, though, is Wico's **3 Way Command Control**, which is the previous stick with knobs on. As well as the smooth grip, you get a moulded one and a large knob. Very useful if you treat your games like a round of golf. The extra grip means, naturally, extra price.

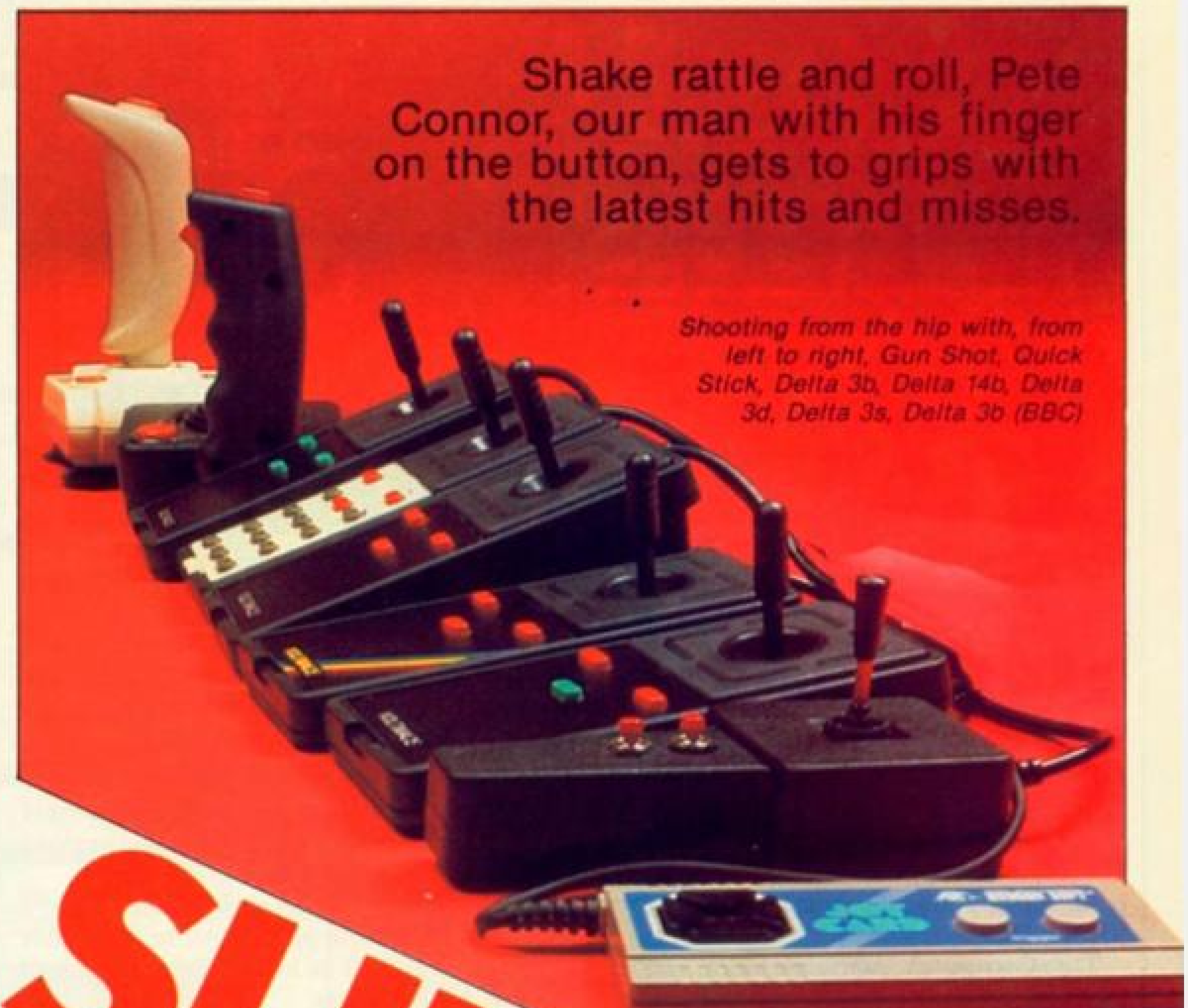
Much cheaper is the **Gunshot 1**, from Vulcan. Smartly turned out in grey and cream, the Gunshot has a big chunky handle that gives you a firm hold on things. Fire buttons are on the base and top of the shaft. It gives a quick enough response and, while not being the sturdiest stick



Goodness gracious, great balls of fire, from left to right, Micropride's Atari trackerball, Marconi's, the AMX mouse, Micropride's BBC trackerball, and Voltmace's data input pad.

SURVEY

Shake rattle and roll, Pete Connor, our man with his finger on the button, gets to grips with the latest hits and misses.



Shooting from the hip with, from left to right, Gun Shot, Quick Stick, Delta 3b, Delta 14b, Delta 3d, Delta 3s, Delta 3b (BBC)

around, seems pretty durable. At the lower end of the price range it's a good buy.

The Champion is another lower-priced stick but it has an auto-fire option as well as buttons on shaft and base. The black plastic grip is comfortable and you get a reasonable response from it. The whole thing is very light — perhaps too light for those who like to bash their sticks around. More restrained players should have no problems.

The **Arcade Turbo** disturbed me by the noisy clicking as I moved the handle. But it didn't seem to affect performance, which was tolerably responsive. The Turbo has buttons on base and shaft and is very solid; it should stand up to quite a lot of punishment.

But not quite as much as the **Super Champ**, which is a fearsomely large construction of heavy black plastic. The long and thick handle with fire buttons on top and in trigger position is secured in the massive circular base by means of a plastic collar that gives strength and the right amount of resistance without sacrificing sensitivity.

The Super Champ's cable rewinds into the base, and provides the occasion for some of the strangest instructions I've seen in a long time: "Rewinding the cable should be always clockwise. If sometimes reverse the direction which may cause extangled to the cable". So now you know.

The **Nidd Valley** brings a welcome change of atmosphere from all these brutal, boasting, macho names. It's like those old Dragon or BBC joysticks, built to be held in one hand and controlled by the other. Unfortunately, the stick you twiddle is rather too small — you can't really get more than two fingers round it. I suspect most people aren't satisfied with a joystick unless they can grab it in a fist and wrench it around.

If you can manage without chunky handles, then the Nidd Valley will do you very nicely. It's micro switched, and so pretty accurate and sensitive. It's also one of the cheaper sticks on the market.

The **Joy Card**, from Hudson Soft, is a funny little thing and is definitely not for the histrionic games player. It's a small, slim rectangular "card" with four direction pads and two fire buttons. After using a joystick for a long time the Joy Card presents problems of adjustment. You most certainly cannot bash it about.

However, once you've got the hang of it it turns out to be sensitive and comfortable. It won't do for all games, and you won't like it if you don't want to use four fingers at the same time, but it's worth having a look at.



The Stick is almost as strange. It looks pretty much like a joystick except . . . Great Scott! What's this? . . . The base is missing!

It doesn't need one. It works by means of "eight-point mercury switches". You get the movement you want by tilting the stick in the required direction. Obviously, this takes some practice since there's no resistance to movement. The Stick, though, proves to be very sensitive and less tiring to use than conventional joysticks.

Of course, it won't do for every game. The distributors say "it is particularly good with race games and flight simulators", and I would endorse that; it performed well on Pole Position but didn't do much for my chance in the Karate game Way of the Exploding Fist. At £12.99 it can't be considered expensive, so it may be worth investigating.

BBC owners used to have a rough time when it came to finding a joystick other than the official Acorn ones which were widely acknowledged to be unsatisfactory, to say the least.

But times have changed. If they want a stick that looks much like everybody else's the **PCA** is just the ticket. It plugs into the analogue port

(continued on next page)

(continued from previous page)

at the back of the Beeb and is made of that old black plastic again, with the red buttons we all know and love. The shaft has depressions to fit your fingers ever so snugly, and is set to one side of the base. Fire-buttons are on top of the stick and on the base.

Control is pretty good with the PCA. My only reservation is that the thing is so light I wonder how much of a bashing it can take.

Voltmace's Delta for the BBC is another analogue joystick. It looks like a TV remote controller, with the small stick set in it at the top. Below that are three buttons; so you must have two hands to use it.

It's a self-centring stick with control that matches others. But the same reservations apply to this as to the Nidd Valley. There's not a lot to grip, and if you get over-excited I wouldn't like to be responsible for the Delta's safety.

Looking a little farther afield, Micropride import a range of joysticks from Taiwan. At the lowest end of the range comes the **Quickstick,** which bears more than a passing resemblance to the Amstrad joystick, without the extra socket. It is small, and rather frail looking, but the grip fits snugly in the hand, and there are three fire buttons, on the top and front of the grip, and on the base. The action seems rather loose, but positive, and seems good value for money.

The **Computek** Atari-style stick gets the award for sheer bulk. In traditional black and red, it dwarfs a standard joystick, standing nearly 20cm. high. Made for the avid decathalete, or



Marconi's trackerball and furless friend, the AMX mouse.

someone who likes to put everything they've got into a game, this one looks as though it would last for ever, certainly long after your Spectrum is an exhibit in the Science Museum.

The Computek stick for BBC computers is of similarly good construction. It is self-centring, with two fire buttons on its large base, and a metal shaft with a bulbous knob on top. It is quite sensitive, and has just the right amount of spring to centre the joystick without making accurate positioning difficult.

I think it was Snaglepuss who used to say "I hate those meeces to pieces", but he'd probably change his mind if he had a BBC and got hold of the **AMX Mouse.**

The AMX Mouse is so impressive because it comes with an excellent drawing program, **ART.** As with the Macintosh MacPaint program, on which it is modelled, this allows you to pull down icons with your mouse instead of having to type in text or otherwise enter commands.

Available options are arranged around three sides of the screen. Move your mouse over the desk until the pointer is on the required option, press one of the buttons and, hey presto!, you're ready to go. For instance, you might want to start with a little graffiti. So you just select the Spray Can icon and off you go. Instant subway art.

It doesn't take long before you're able to do quite sophisticated drawings. Mistakes don't matter because all you do is pull down the eraser and rub them out. Although the program is monochrome there is a choice of 32 different patterns so a wide variety of effects can be obtained.

Other software available for use with the AMX Mouse includes a Utilities disc with icon designer and Desk, a program containing diary, memo pad, etc.

The first thing you have to do with **Connexions' Magic Mouse** for the Commodore 64 is assemble it — ball and carriage are separately packed for safety. The software includes a Hi-Res Graphic Designer — in other words, a drawing program. It's similar to the AMX one, with the major difference that the menu of icons is not constantly displayed.

You have a choice of nine brushes giving a good variety of width and stroke. As with the AMX you can draw circles and boxes, fill in backgrounds and dump to a printer. This mouse, though, seemed a little inaccurate; it circles came out rather less perfectly than one might have expected.

Also included in the Connexions package are a Sprite Designer, an Icon Designer and a Mouse Controller which enables you to write your own software for the wee creature.

It's been said that a mouse is really just an inverted tracker ball. But it would be a foolish man who tried to use **Marconi's Tracker Ball** for the BBC upside down. It's a hefty piece of peripheral, with a large brown ball set in the solid base. Marconi supply some software with it, including a painting program. This is not as sophisticated as AMX Art, but it does show just how accurate and sensitive the tracker ball can be.

The Tracker Ball can also be used with some — but by no means all — joystick-compatible programs. But how many games, Missile Command apart, would you want to use a tracker ball with? Not many, I'll wager.

Micropride also import two trackerballs, one for the BBC, and the other Atari style. The usual problems apply, at £19.95, they are expensive and don't seem to offer great advantages over the conventional joystick. This is not the fault of the trackerball, merely the fact that almost all software is designed to be controlled by joystick.

As far as the Atari version goes, the box is 15cms. square, and even during the most vigorous spinning will stay rooted to the spot. The ball moves quite freely and there are fire buttons to the left and right of the ball. One advantage over joysticks is the speed with which you can stop and change direction.

The BBC version obviously has more potential as, here, the position of the ball can be directly related to a position on the screen, but again, not really designed for use with most commercial software. ■

Name	Price	Company	Address
Formula 1	£16.95	Kempston	Unit 30, Singer Way, Woburn Road Industrial Estate, Kempston, Bedford. 0234-856633.
Formula 2	£11.95	Kempston	
The Boss	£15.99	Computer Games	CGL House, Goldings Hill, Loughton, Essex IG10 2RR. 01-508 5600.
The Champion	£11.99	Computer Games	
Bat Handle	£27.99	Computer Games	
3 Way	£32.99	Computer Games	
Gunshot 1	£8.95	Vulcan Electronics	200 Brent Street, Hendon, London. 01-203 6366.
Arcade Turbo	£22.95	New Horizon	1 Goodall Street, Walsall WS1 1QG. 0922-24821.
Joy Card	£8.95	New Horizon or Orpheus Ltd.	The Smithy, Unit 1, Church Farm Estate, Hately St George, Nr Sandy, Beds. 0767-51481.
The Stick	£12.95	Lightwave Leisure	2 Maldwyn Road, Liscard, Wirral, Merseyside L44 1AL. 051-639 5050.
Delta 3b	£12.00	Voltmace Ltd.	Park Drive, Baldock, Herts SG7 6EW. 0462-894410.
Datapad	£34.95	Voltmace Ltd.	
Delta 14b	£29.95	Voltmace Ltd.	
Delta 3d	£10.00	Voltmace Ltd.	
Delta 3s	£10.00	Voltmace Ltd.	
AMX Mouse	£89.95	Advanced Memory Systems	Woodside Technology Centre, Green Lane, Appleton, Warrington. 0925-62907.
Magic Mouse	£59.95	SMC Supplies	11 Western Parade, Great North Road, Barnet, Herts. EN5 1AD. 01-441 1282.
Trackerball	£60.00	Marconi Electronic Devices	Doddington Road, Lincoln. 0522-688121.
Quick-stick Computek Trackerball	£7.50 £9.95 £19.95	Micropride Ltd	Unit 16, Shipyard Industrial Estate, Brightlingsea, Essex. 0206-364957.

PREPARE YOURSELF FOR THE HIGHWAY ENCOUNTER.

Vortex SOFTWARE

APPROACHING FAST...

BRAIN-BLOWING GRAPHICS...MEGA-BLASTING POWER...FAST-ACTION PLAYABILITY...
'HIGHWAY ENCOUNTER'...A TOTALLY NEW DIRECTION FROM VORTEX.

ONCE YOU'RE ON IT...THERE'S NO TURNING BACK.

· HIGHWAY ENCOUNTER FOR SPECTRUM 48K · £7.95 ·

VORTEX SOFTWARE (SALES) LIMITED, VORTEX HOUSE, 24 KANSAS AVENUE, OFF SOUTH LANGWORTHY ROAD, SALFORD M5 2GL.

ENTERPRISE *Competition* RESULTS

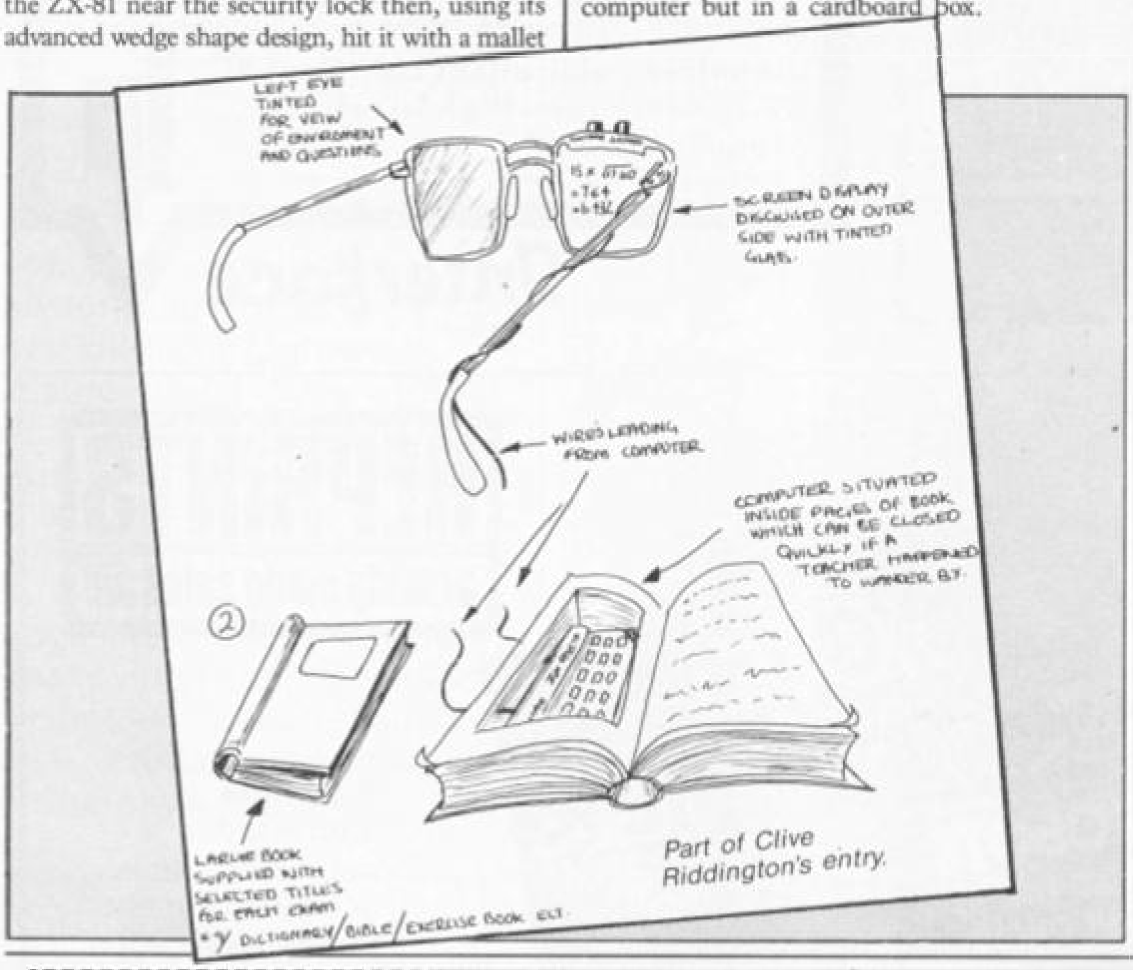
In May's competition to win an Enterprise 128 plus a printer you were asked to come up with an idea either for cheating in an exam, or for pulling off a computer scam. To our surprise this sparked off a minor scandal.

Teachers and headmasters accused us of trying to subvert the exam system: copies of *Your Computer* were withdrawn from school libraries, school kids protested, and questions were asked in the House. In our defence we protest that the competition was intended as a light-hearted jape; and to our detractors we reply: Come off it Chalky! Where's your sense of humour?

Needless to say most of the entries took the competition less seriously. C. Holland suggested a way of using the ZX-81 to hack open the computer-controlled security door of a bank: place the ZX-81 near the security lock then, using its advanced wedge shape design, hit it with a mallet so forcing the door open.

J. Andeh's idea was to program a computer to control a robot arms on wheels. During the exam the robot is to approach the supervisor and yank down his trousers. In the ensuing confusion you can take out a pre-prepared crib sheet and start cheating. This entry was nicely illustrated by a cartoon in the style of the Beano's Bash Street kids.

H. Kay revealed his three-part plan for making sure that he won the competition. First, break into the computer-held record of competition entries and delete all other entries. Second, hold *Your Computer's* memory banks to ransom. Third, alter BPI's records "to show that I am editor of *Your Computer*, whose decision is final". Just as well that the entries are not stored on a computer but in a cardboard box.



Part of Clive Riddington's entry.

As you might expect many people hit on the idea of using hidden radio transmitters to communicate with computers during an exam. Seiko wrist micros were also popular, as was the technique of projecting answers on to spectacle lenses.

The best entries along these would-be practical lines were from R. Buckley with his comprehensive Cheat-O-Matic system, and C. Riddington with The Perfect Exam Cheat Implement.

All those mentioned above receive the runners-up prize — copies of the Hackers Handbook and Computer Crimes and Capers.

We awarded the first prize to one of the most entertaining entries submitted in a long time, which came from Manolo Abd-El-Baki, 21 Rue Daniele Casanova, 91330 Yerres, France. This amounted to a definitive study of cheating, or cheatology as the author calls it.

Cheating philosophy

At the start Abd-El-Baki discusses the philosophy of cheating. He argues that "cheating is a basic need for virtually all students" and cites the Greek philosopher Aesopius, who said "cheating is the mother of all wisdom".

Following this he takes a look at the history of cheating and makes the bold claim that "the search for the perfect method of cheating has been man's greatest preoccupation since the dawn of civilisation".

Finally he gives the specifications of his new model, the SOGE — Standard Operational Cheating Equipment — accompanying them with diagrams and formulae. A team of *Your Computer* scientists is now carrying out a feasibility study on the system, and its full details cannot be disclosed here. Suffice it to say that SOGE involves a pair of glasses, a contact lens, and a strip of microfilm.



SPECIAL OFFER–

ONLY £3.95



Here's your chance to get your hands on the best book around on the Micronet for Spectrum owners – and at £3 off the normal selling price of £6.95.

"A novel idea which has been well executed by Melbourne House. A lot of information has been packed into such a small volume and no Micronet user should be without it"
– Sinclair User

"Set to become the definitive handbook on Micronet for Spectrum owners."
– Micronet 800

"Occasionally one comes across a book which is the definitive source for all information on the subject. The Spectrum Micronet Handbook published by Melbourne House and written by Alan Giles is in this class and no VTX500 owner should be without one"
– Keith Rose, Modem House

To take advantage of this great offer, complete the coupon below and mail to: Modem House, Iolanthe Road, Exeter, Devon EX4 9EA.

MODEM HOUSE

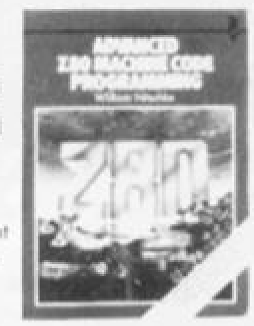
Please send me my Micronet Book at £3 off the normal selling price of £6.95. I enclose a cheque for £3.95 made payable to MODEM HOUSE

Name ....

Address ....

....

ADVANCED Z80 MACHINE CODE



A new authoritative guide, for those who want to improve their Z80 machine code programming skills to a genuinely professional level, has just been published by Interface, at £12.95.

If you already know the fundamentals of programming in Z80 machine code, and now want to expand your skills, to tackle advanced, serious and practical program development, then this is the book for you.

Advanced Z80 Machine Code Programming, by William Nitschke, fills a serious gap in the literature on programming the Z80. Rather than dealing with the elementary concepts of Z80 architecture, this new book discusses the material you now need to know to advance your skills. The core of the book looks at popular programming applications. Starting with the basics of organising information, generating arrays and tables, block moving, shifting and erasing, string manipulation, data compression and command tables, it moves on to advanced applications like word and sentence decoding. Games programming is then examined in detail, including three-dimensional maze generation, animated graphics and the development and coding of arcade games, and the synthesis of speech and sound effects. There is also a complete set of 'undocumented' Z80 instructions.

You can buy *Advanced Z80 Machine Code Programming* by William Nitschke (ISBN 0 907563 90 2) at £12.95 from most book and computer stores, or direct from the publisher, post free, at:

Interface Publications Ltd., Dept YC,
9-11 Kensington High Street,
London W8 5NP
(Trade only: WHSD Leicester)

Interface

REPRINTS

a ready made sales aid



If you are interested in a particular article or advertisement in this publication why not take advantage of our reprint service. We offer an excellent, reasonably priced service. For further details and a quotation.

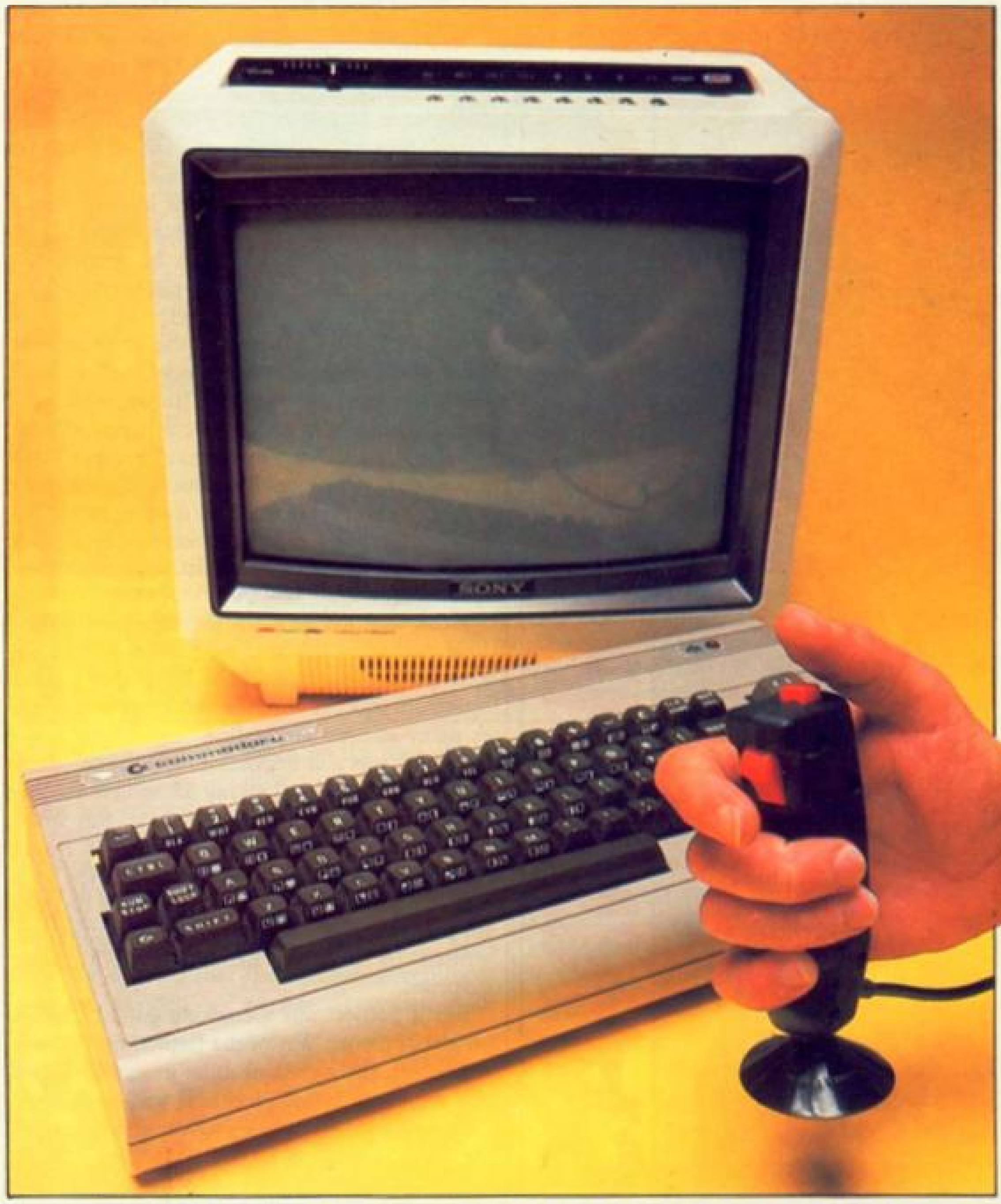
RING KAYE JONES ON 01-661 3779

50 STICKS MUST BE WON

£600 Competition

RULES

- The winner of the competition will be the person who, in the view of the editor, puts the joystick features in the right order and comes up with the most interesting idea.
- The name of the winner will be printed in the November issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in August 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- Business Press International assumes no responsibility or liability for any complaints arising from this competition.



Now you can win the revolutionary Stick — a joystick from Lightwave Leisure which does without a base by using mercury switches. It plugs straight in to any standard 9-pin joystick port. All you have to do is put five features in order, then dream up your ideal system for on-screen control — speech, sound, sci-fi variations on joysticks — the sky's the limit.

YOUR COMPUTER 50 STICKS COMPETITION

Number these five joystick features — 1 for the most important down to 5 for the least.

- ☐ Responsiveness
- ☐ Button positions
- ☐ Comfort
- ☐ Price
- ☐ Strength

Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea for an ideal computer control system, to Stick Competition, *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Name ______________________

Address ______________________

____

Idea (written or drawn, use extra space if necessary). ______________________

____

FIRST FIST, THEN

FIRST FIST – THEN, Mordon's Quest, Terrormolinas, and Lord of the Rings plus conversions of Starion and Fist for other machines – not to mention future projects like a Whitbread Round the World Yacht Race game and enhanced versions of current hits for new machines like the Commodore 128.



TERRORMOLINAS

Knuckle wrestler Geoff Heath, Melbourne's new U.K. chief, still plans to go ahead with the launch of Terrormolinas – a holiday disaster spoof adventure by the team who wrote Hampstead – despite the trail of real life disasters facing tourists this summer, from hijackings and bombings in mid air and on Spanish beaches to alerts in British resorts.

Everything seems to be coming up roses for Melbourne House since Geoff Heath became British boss a few months back but he would be the first to admit that the seeds of success had already been sown. The current wave of strong software was all under development long before Geoff took control, but when he arrived the company had faded out of the public view with Starion waiting to be launched.

Although Fred Milgrom, the international head of Melbourne House, admitted to *Your Computer* that the likes of Ultimate were producing arcade games that "were technically far superior to what we were coming up with" and promised to do something about it, that was over a year ago and there was still no sign of action. Melbourne was a leading adventure house but had no chance of catching up with the arcade specialists.

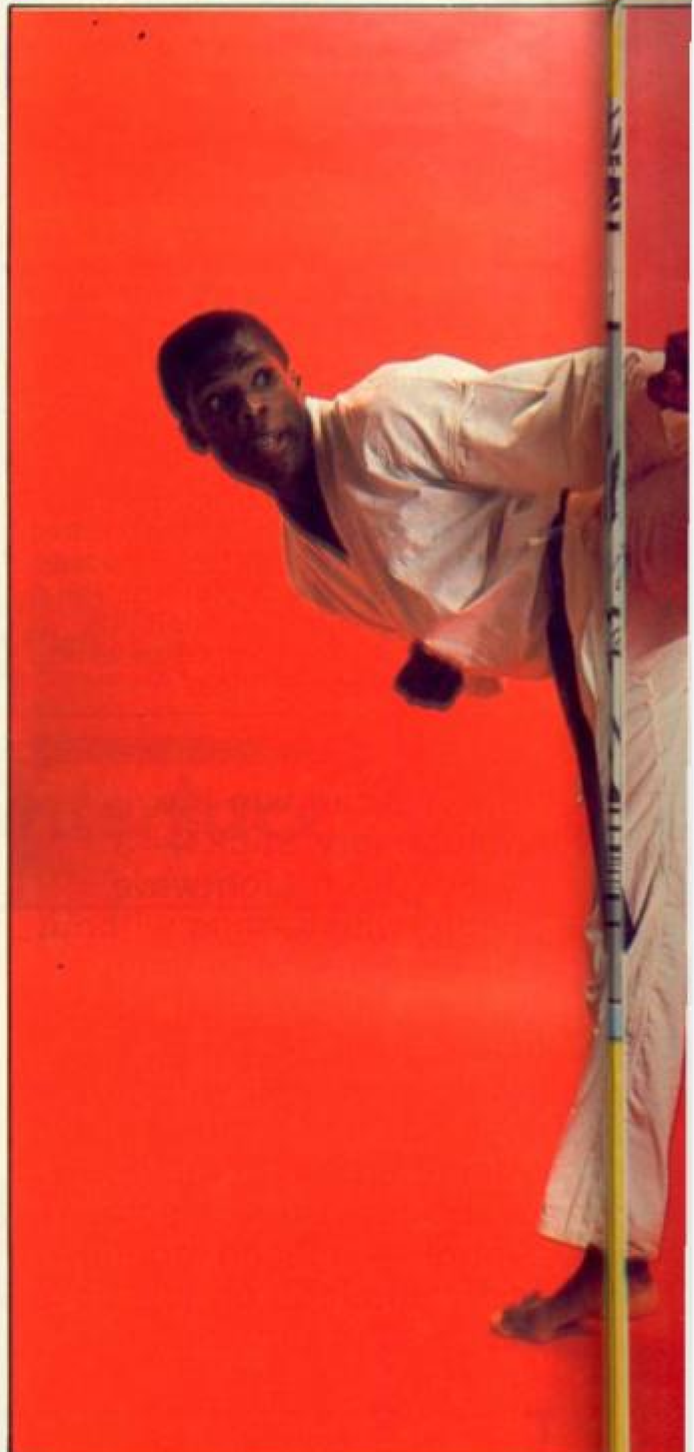
Geoff decided to scrap the expensive video-style packaging planned for Starion and go for a simple cassette case in the belief that a good Spectrum shoot'em-up just needed to be seen on as many shelves as possible.

Timing was also important – with thousands of Spectrum owners looking for something like Elite to come out on their machine. But when Starion hit the shelves the quality of David Webb's vector graphics on screen and the idea that Melbourne House could produce a successful program that was neither an adventure nor written by an Australian were both major surprises.

But if Starion was a cracking good variation on an old theme, Way of the Exploding Fist was something else – one of those programs which sets standards by which others will be judged. Timing again was nice – out in good time for the World Games at Crystal Palace on July 27 where non-Olympic sports like Karate will have their world championships.

Jeoff Thompson, World Heavyweight Karate Champion from 1982-84 and Team Champion now, who is competing there, believes that Fist has enough of the feel of the real thing to attract computer gamers into abandoning the screens and taking up Karate. Jeoff urges caution though "I want to see the sport develop – and safely. If they wish to take it up go to a local karate club but be careful". If anyone plays the game then wants advice on taking up the sport they can write to him for advice at Pursuit of Excellence, PO Box 699, Fulham, London SW6.

Jeoff first tried Fist at the Commodore show "it looked very authentic, movements, drop sweeps – the mood, music and atmosphere" but he couldn't take it seriously – until he had suffered the indignity of being repeatedly laid out by kids of half his age, "I got really competitive". With three hours a day training for the championships – "it's a combat form of chess, you never really master it" – Jeoff has not had

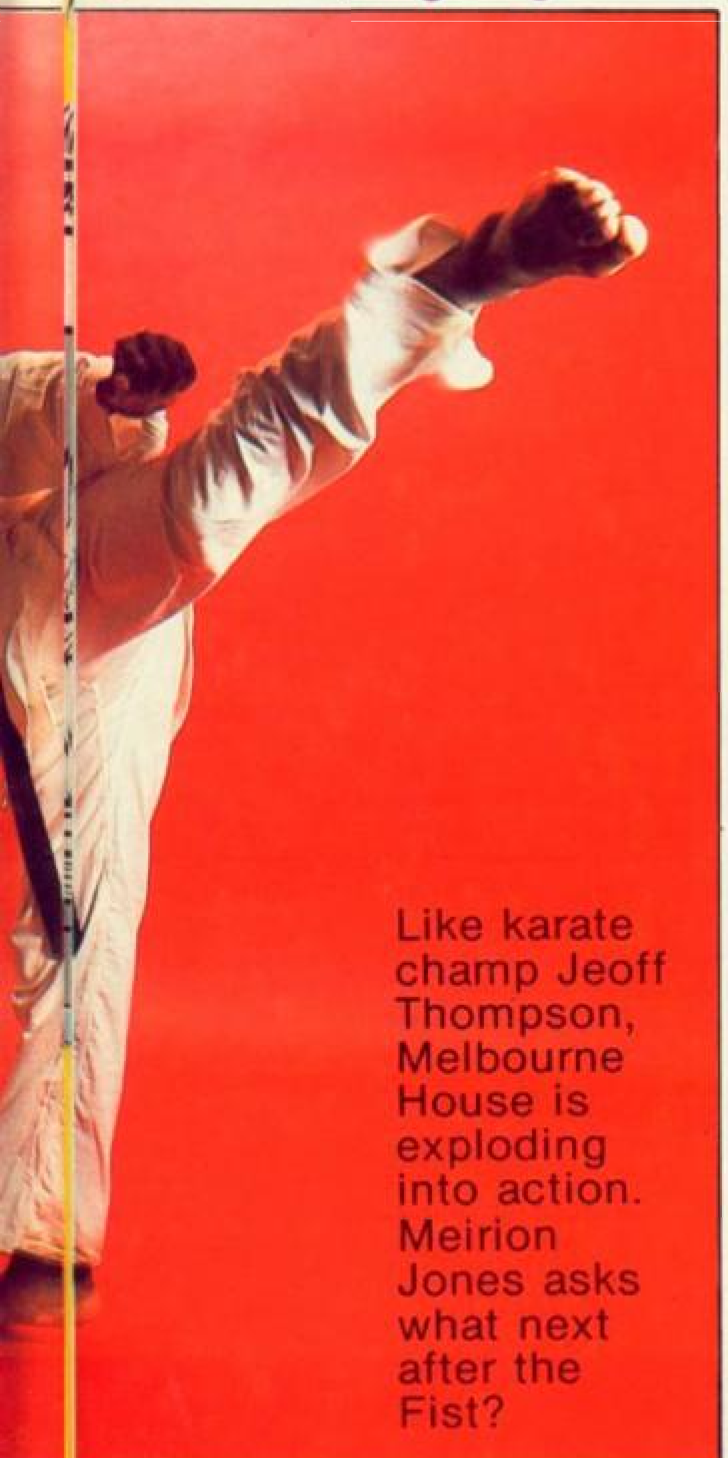


much time to improve his game on screen but he uses it as a break from training. He'd like to see a sport version where you take on teams from other countries.

After Starion and Fist, which were the May and June blows in Melbourne's Summer offensive, July drops into lower gear with Mordon's Quest. Geoff Heath was born in Morden, and if my supposedly efficient Croydon-based hire-purchase company claims to operate from Croyden on its headed notepaper, I suppose these Aussies can get away with a mis-spelt tribute to the head of the British office.

But no, Mordon's Quest turns out to be just the next text only stage in the Classic Adventure. Mordon is apparently the most important person in the history of the universe so I suppose he need not worry about being mistaken for a grey south London suburb stranded between

EN . .



Like karate champ Jeoff Thompson, Melbourne House is exploding into action. Meirion Jones asks what next after the Fist?

Mitcham and Cheam.

About the only significant feature of the Quest is that it will be ready simultaneously in Spectrum, CBM-64 and Amstrad versions whereas Starion and Fist will gradually migrate to other machines over the next couple of months.

Summer migrants to Spain are the targets of Terrormolinas, an adventure aimed at people who do not usually buy adventures by the team who wrote the snobby social climbing computer game Hampstead — Peter Jones and Trevor Lever. Peter works in public relations and he says that Hampstead went down well although "*Your Computer* were fairly scathing about it. It was tongue in cheek which perhaps you didn't realise". At least that well known micro mag The Listener made it their computer game of the year.

This time Peter and Trevor are taking more of a chance. Terror is based on the idea of collecting snapshots — unlike its predecessor this game has graphics — during a Spanish holiday in which everything that could go wrong does go wrong — from tummy bugs to bombs. Despite the risk of accusations of bad taste if tourists are hurt on the Costa Brava this year, Peter says it's "less risky than actually going to Spain". He's also not worried that the Spanish government may be offended — "we haven't written it for the Spanish tourist industry. I hope it does offend some people".

No wonder Fred Milgrom asked them to "be nicer to the Spaniards" when he saw an early version. Fred's other contribution was the name Terrormolinas which he suggested as an alternative to the working title which was Holiday in the Sun — after the Sex Pistols song.

A global conspiracy game is what Trev and

(continued on next page)

LORD OF THE RINGS



Good news for Frodo fanciers. Fellowship of the Ring, first part of Tolkien's Ring and eagerly awaited sequel to the program which established Melbourne's reputation — The Hobbit — will appear in late September. Philip Mitchell, left, who programmed The Hobbit and Sherlock Holmes is team leader for Lord of the Rings and is seen here back at base with Lyn and Russel Comte and Fred Milgrom, right, who is the international head of Melbourne House.

STARION



Commodore 64 and Amstrad versions of Starion are on the launch pad now that the Spectrum shoot'em-up is hurtling up the charts to prove that Melbourne House can produce arcade games as well as adventures.

MORDEN'S QUEST



Mordon's Quest takes up where Classic Adventure left off. It's a 150 location text adventure and Mordon is the ancient one who asks you to find all the components of his immortality machine — if you fail the universe will be destroyed.

(continued from previous page)

Pete are working on next — sounds a little closer to the "plain of Tharg and the misty mountains of Blimp" which are the traditional settings for adventures and which they find "almost incredibly narrow".

Lord of the Rings

Meanwhile back at the Victoria branch of the Melbourne House global conspiracy Philip Mitchell is leading the team working in the ultimate misty mountains adventure — The Lord of the Rings. After the Hobbit — which was also programmed by Philip — expectations are high so there will be no attempt to cram the whole thing into one game. He and his team, which includes "Fred's creche" — a bunch of University of Melbourne computing students moonlighting in the vacations — are putting together The Fellowship of the Ring, the first part of the Tolkien Ring trilogy which again like the Hobbit will be a book plus game set to be released in late September. Then the other parts — the Two Towers and the Return of the King will be released at six month intervals. Before the Two Towers appears the Whitbread Round the World Yacht Race, which will run from this September to next March, should have made it to Australia and back again. Appropriately Milgrom plans a simulator game based on the race where you have to use radar and satellite navigation as well as fighting off the hazards of the sea.

Now that Melbourne House has a British boss — below Fred but at least every decision does not have to make the passage to Australia and back — the company seems to find it easier to hold to its intended course over here.

Geoff Heath does not think that the problems of Acorn, Sinclair and the like are a real threat to the software industry. "Even if Sinclair is having problems right now I don't believe the consumer is worried by that. People have still got money to spend". Piracy is not such a problem either "if you produce a good product at a good price" and the "new copyright act will help".

He believes that most of the small software houses that have folded were bound to go anyhow. "The days of starting up in a garage and running off a few hundred are over. The big software houses — under 10 companies count — are run as businesses. Soon there will be six or seven companies with others under their wings".

Looking forward to more Ram

New machines mean it takes more programming time to create games that will take advantage of increased Ram — which again favours companies with big resources, but programs like Fist use every last byte of the 64's memory and Melbourne's teams are already looking forward to the luxury of 128K Ram and beyond. "More memory has never been enough for the programmers" as Geoff points out. At first they will produce enhanced versions of existing games for machines like the CBM-128.

Melbourne will still carry on producing books, for people who have just bought a micro "to tell them there are other buttons on it than shift and run" or who want to go on to machine code — "the helicopter head stuff".

Before joining the Milgrom organisation Geoff was Mr Activision in this country so he's seen it all but he is still enthusiastic about computer games. After all "there's no other business where you can go home at night and be a karate expert".

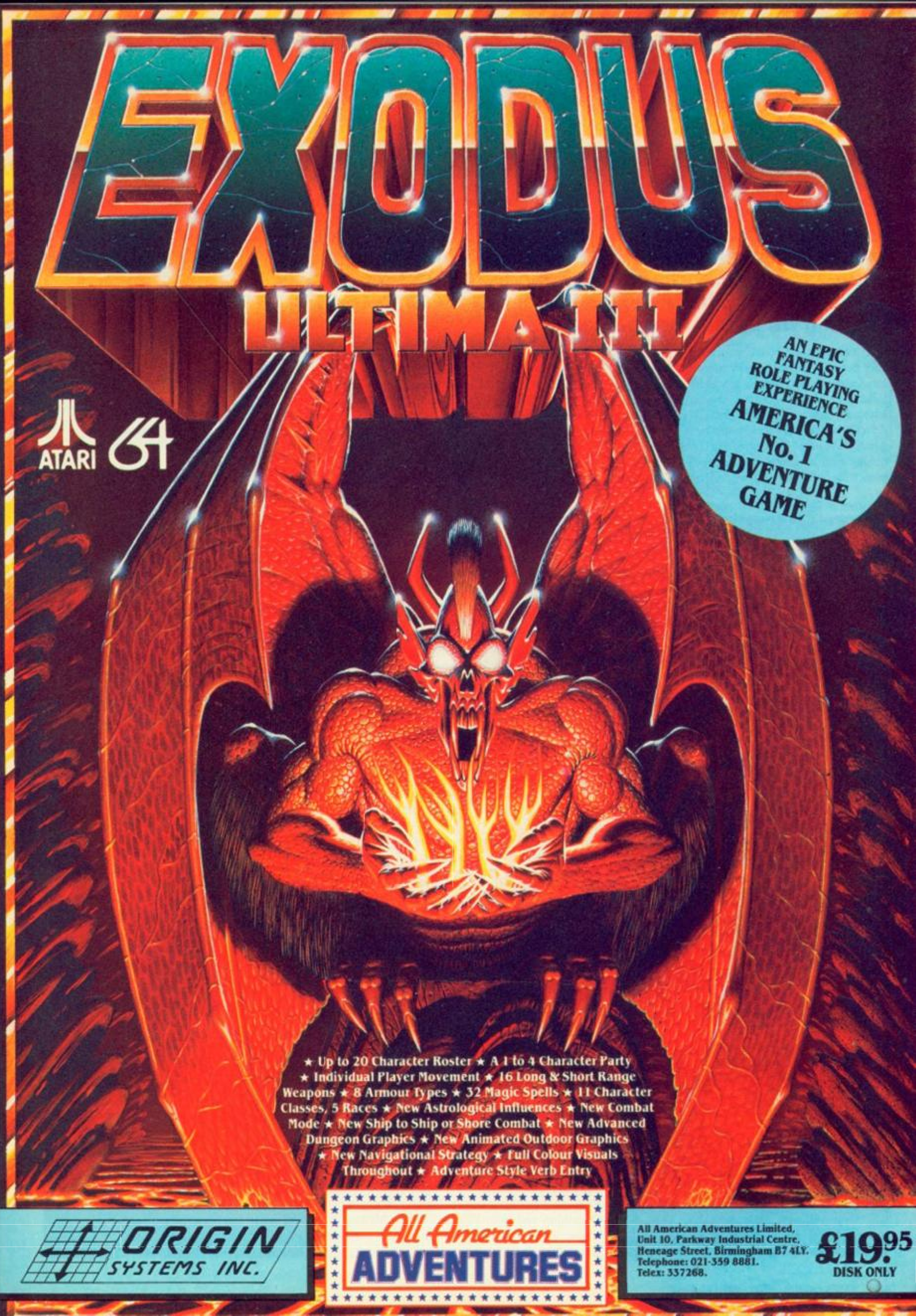




EXPLODING FIST



Gregg Barnett, who converted the Hobbit and Sherlock to the Commodore before making his mark with Way of the Exploding Fist, is now converting Fist to the Amstrad and Spectrum and — memory permitting — the BBC, in other words if the Plus ever takes off.



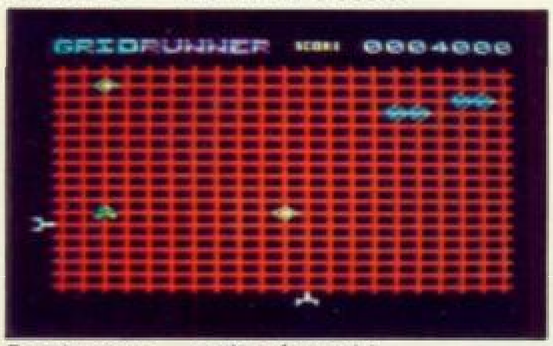
EXODUS
ULTIMA III
ATARI
64
AN EPIC FANTASY ROLE PLAYING EXPERIENCE
AMERICA'S No. 1 ADVENTURE GAME
★ Up to 20 Character Roster ★ A 1 to 4 Character Party ★ Individual Player Movement ★ 16 Long & Short Range Weapons ★ 8 Armour Types ★ 32 Magic Spells ★ 11 Character Classes, 5 Races ★ New Astrological Influences ★ New Combat Mode ★ New Ship to Ship or Shore Combat ★ New Advanced Dungeon Graphics ★ New Animated Outdoor Graphics ★ New Navigational Strategy ★ Full Colour Visuals Throughout ★ Adventure Style Verb Entry
ORIGIN SYSTEMS INC.
All American ADVENTURES
All American Adventures Limited,
Unit 10, Parkway Industrial Centre,
Heneage Street, Birmingham B7 4LY.
Telephone: 021-359 8881.
Telex: 337268.
£19.95
DISK ONLY

NAME YOUR T

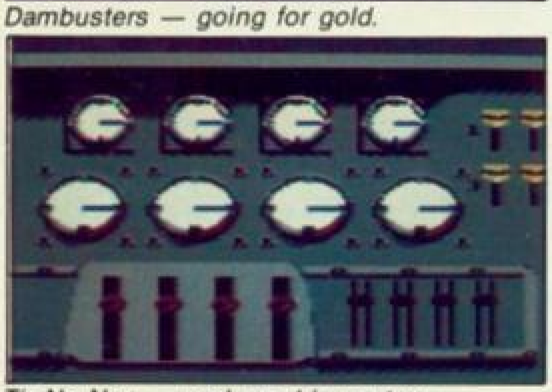
Just name your top 10 games and win a Commodore 64, a CPM machine and 128K of Ram all rolled into one — in other words the Commodore 128. Sounds easy — but as Ellie Dee, Elsie's elder sister, finds out you can be spoilt for choice.

ALTHOUGH PURISTS tell you there's no difference between the early jerky monochrome space invader clones and today's games like Skyfox and Raid Over Moscow, or that adventures have not advanced since Crowther and Woods Classic Adventure, the qualitative jump between chasing white blobs around the screen and playing arcade quality games in your own home came with the launch of popular colour computers — the Vic-20 in Summer '81 and Spectrum in Spring '82.

Gridrunner — the Vic-20 classic.



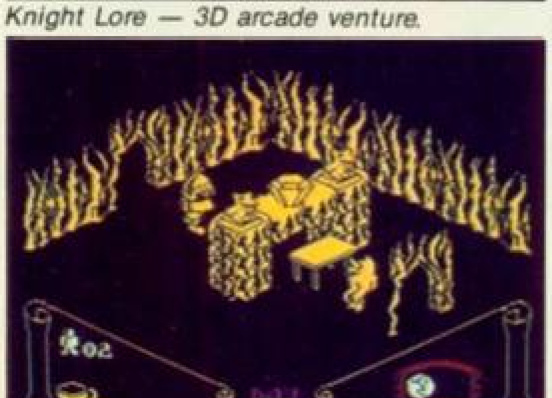
Dambusters — going for gold.



Tir Na Nog — real graphic venture.



Knight Lore — 3D arcade venture.



Games like Jeff Minter's Gridrunner made good droid-zapping use of the Vic with enough colour and buzz-saw sound to keep you mesmerized. It had that magic addictive ingredient which puts it in my all time top ten — unlike Minter's later efforts which were technically more proficient, colourful, tuneful and complex but less fun to play.

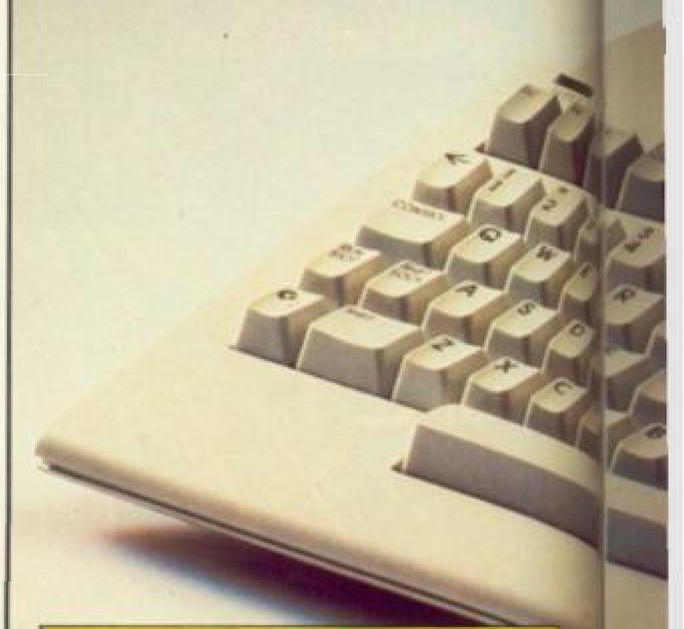
Meanwhile in America Atari waded in with a whole series of cartridge games that were to set the standard for the home arcade. Missile Command, Defender, Star Raiders and Pole Position all used the Atari 400 and 800's superior graphics and sound capabilities while the quirky Oric went another way, even if the price of machines and software kept them out of the hands of all but a few British Atari fanatics.

Pole Position was unchallenged as a racetrack game until the likes of Talladega on the Commodore 64 and Revs on the BBC. Star Raiders was only upstaged by the slower and more thoughtful Elite this year. Buck Rogers-type games passed me by although Zaxxon still has its champions. Frogger spawned hundreds of copies, elaborations and even simplifications like Jumpin' Jack which has a charm of its own; snake games slithered out of all the software houses and every self-respecting micro had to have its own version of Galaxians.

But nothing compared with the Pac-Man madness that swept two continents and slides into my 10 toppers. If Pac-Man had arrived a couple of years later it would probably have been called Ghostbusters. Pity it didn't play as good as it sounded on the 64.

In Britain in 1983 Manic Miner singlehandedly raised expectations of what the humble Spectrum might achieve and platform games became the rage. At the same time strategy struggles like Eastern Front, or on a less serious level Football Manager, developed. The Commodore 64 allowed more realistic sports games on screen — like International Soccer which set new standards for realism.

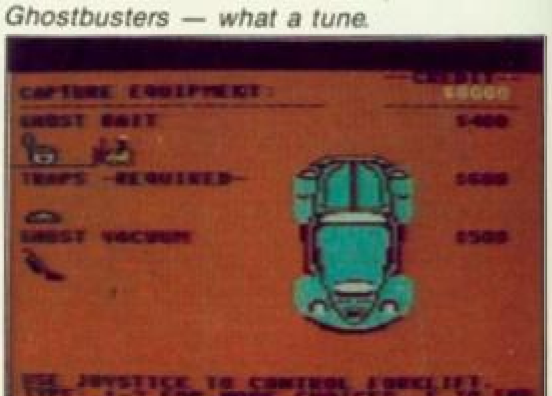
The bigger memory of machines like the 48K Spectrum 64 allowed adventure writers to go for epics like the Hobbit. Tir Na Nog might make my ten. Knight Lore definitely does — I love the 3D crossword style of arcade adventures with those Filmation graphics. You need little reminding of the outstanding programs of the last year, some of the strongest yet. From Fighter Pilot and Boulderdash to Daley Thompson's Decathlon and Solo Flight, David's Midnight Magic and Lords of Midnight or the current wave of block busters — Dambusters and co.



RULES

- The winner of the competition will be the person who, in the view of the editor, comes up with the most amusing or clever idea for a new screen, room or feature for their favourite game.
- The name of the winner will be printed in the November issue of *Your Computer.*
- All entries must arrive at the *Your Computer* offices by the last working day in August 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of BPI or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- BPI assumes no responsibility or liability for any complaints arising from this competition.

Ghostbusters — what a tune.



TOP 10 GAMES AND

Competition



WIN A CBM-128

YOUR COMPUTER

CBM-128 COMPETITION

1 ______________
2 ______________
3 ______________
4 ______________
5 ______________
6 ______________
7 ______________
8 ______________
9 ______________
10 ______________

Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea, which can be written or drawn or both, for a new screen, room or feature in your favourite game plus a list of your Top 10 commercial games to *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Name ______________________________

Address ______________________________

____

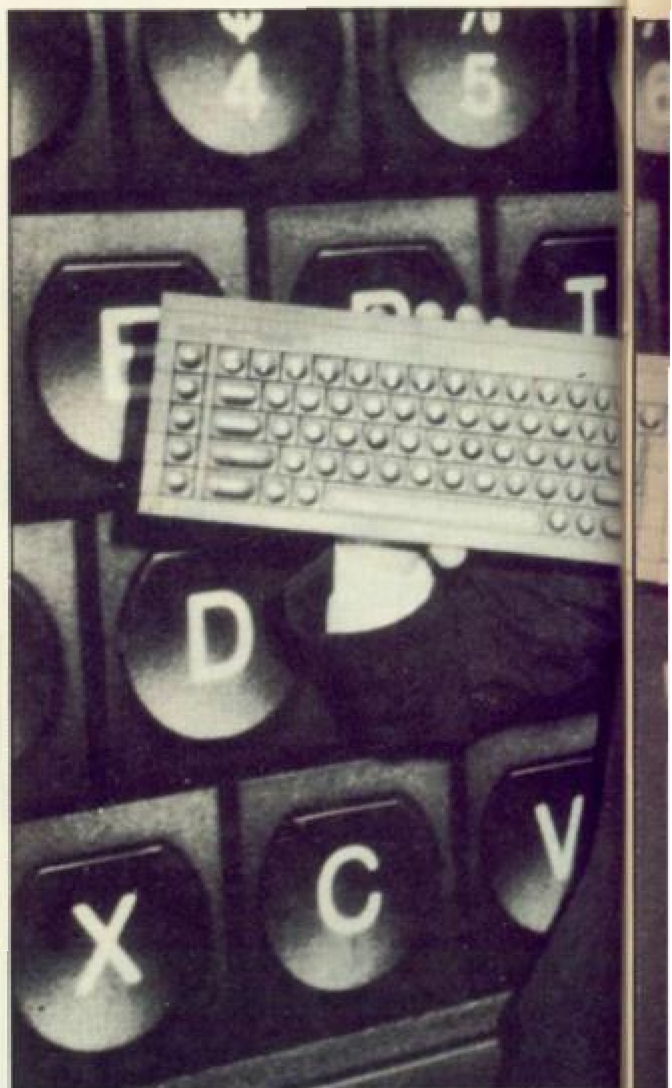
Written or drawn idea for new addition to an existing game — use extra paper if necessary.

____

____

THE SINCLAIR QL





In the wake of Clive Sinclair's financial trouble John Dawson reassesses potentially his biggest money-spinner — the QL.

THE LAUNCH of the Spectrum's successor, the 16 bit QL with its 68008 central processor unit, exceeded anything that had gone before in terms of advance publicity. It was unfortunate that, once again, the manufacturer's marketing advisers took precedence over wiser judgment that the QL machine wasn't ready either in terms of the quality of the software or the factory's capacity to deliver.

The operating system software and Basic interpreter contained numerous errors and a series of new Roms have been issued in the course of the first year. That's a depressingly familiar story but it occurs across the board in microcomputerland; remember the early Eproms in the BBC Micro and the problems with the Oric. Writing original software is very difficult, particularly at the low level of an operating system. The new Apple software for the Lisa — a comparatively unsuccessful launch, but for different reasons — and the Macintosh, took more than 100 man-years to write at the cost of a king's ransom.

But, admire Sir Clive Sinclair's entrepreneurial spirit as you may, if you take delivery, several months after placing your order, of a machine which doesn't work properly, you are likely to discount your role in the British computer industry's success story and demand a better product.

Now leave all these aside, for if you buy a Sinclair QL microcomputer today they are past history, how good is the QL as a general purpose microcomputer now, and what sort of value does the machine represent for the money you are spending?

Hardware is less important than software at the level of complexity represented by the Sinclair QL. Nevertheless, it is the hardware that provided the basis for the name "QL". A quantum is the smallest quantity of some physical property, such as energy, that a system can possess according to the Quantum Theory.

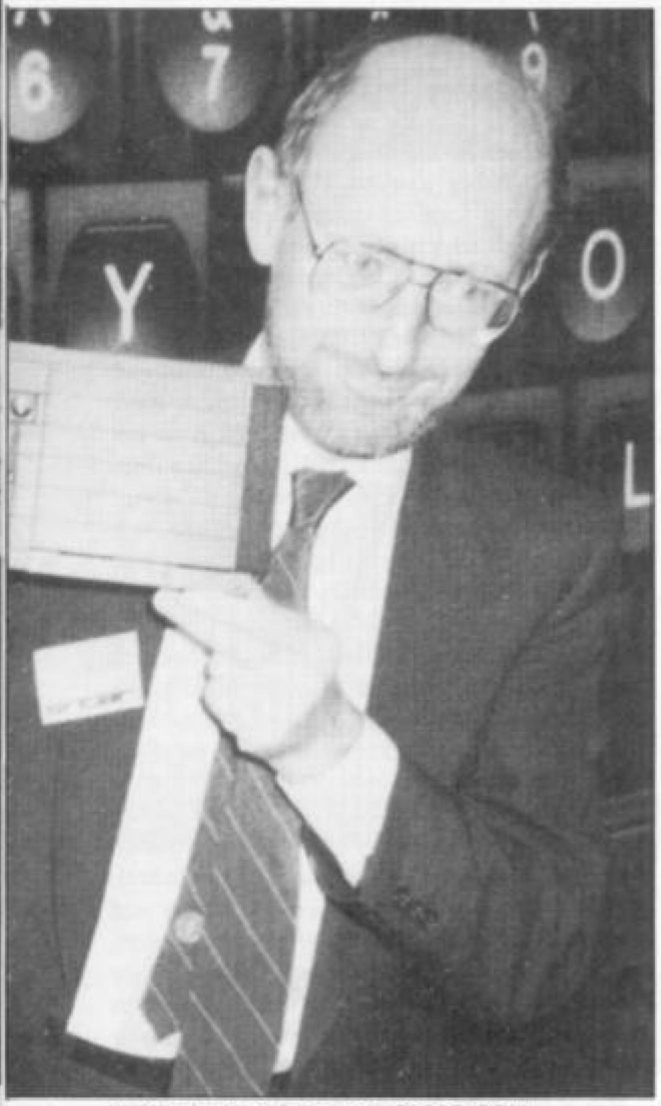
The QL is 48 cms — 19in. — long, 14 cms — 5in. — deep, 5.5 cms — 2in. — high and weighs 1.5 kilograms. In that space is the main printed circuit board, two Microdrive tape units and the keyboard. Compare these measurements with the BBC Micro's 16 by 14 by 2.5in. and you will appreciate that the QL is comparatively portable.

Unlike the BBC Micro, the QL has a separate power supply which weighs about one kilogram; but the BBC requires a separate tape recorder or floppy disc drive for mass storage of programs or data.

Communication with peripheral devices is an important part of the design of a successful microcomputer. Compatibility and standardisation are effected at several levels, from the design of the plugs and sockets at the lowest level, through to software protocols that will control the transmission and interpretation of information at the highest. There are 11 sockets on the QL:



— IS IT MATURING?



1 64 pin bus from the 68008 CPU
2 Rom cartridge socket for plug in software cartridges
3 Two control socket for joysticks
4 Two non-standard RS-232 sockets — leading to one RS-232 interface
5 UHF output providing modulated RF for a TV
6 Video outputs
 — RGB + synchronisation
 — Monochrome + composite synchronisation
 — Composite PAL video
7 Power — Power supply unit delivers 5 volts at 1.8 amps and 15 volts AC at 0.2 amps
8 Two 3.5 mm sockets for linking up to 63 QL computers into a type of Local Area Network

There is no parallel port which would be compatible with a Centronics interface on a printer. The control sockets for games joysticks are inputs which are switched on or off rather than the accurate, if slow, analogue to digital converters on the BBC computer.

On the other hand, the inputs in each QL control socket have been arranged to correspond to two different, and very useful, sets of keys on the keyboard. If you wanted to write a program, for example, that would allow a disabled person to use a wordprocessor program, this arrangement would give you a good start. By most standards the QL is resonably well equipped in terms of the input/output hardware.

The QL keyboard consists of two plastic membranes which have opposed metallised pads underneath the hard plastic keys. When a key is depressed the two pads are squeezed together and an electrical contact is made. The keys travel a reasonable distance down and up when they are pressed but there is no definite point at which you can be sure that an entry has been accepted by the machine.

Visual display unit manufacturers like Televideo make computer terminals that will stand up to continuous use for many hours each day and they use orthodox keyboards which feel like an electric typewriter.

One of the best keyboards that I have come across was on the original Nascom. That used semiconductor Hall effect switches which operated when a tiny magnet was moved by the operator's finger pressing on the key. There were no mechanical contacts in the Nascom keyboard and no "bounce" or multiple character entry.

After the Nascom there was a steady tendency to downgrade the quality of the keyboard in new machines, presumably because the economics of competition have intruded more and more into domestic microcomputer design.

However, the QL keyboard feels much better than the Spectrum or the first Oric and the improvement is probably due to the influence of the BBC microcomputer keyboard which is acceptable to both secretaries and scientists.

Two Microdrive cartridges provide built-in mass storage of programs and data on the QL. Each cartridge will hold a maximum of 100 Kbytes and the continuous loop of tape completes one traverse in seven seconds. The BBC machine requires either an external tape recorder or floppy disc drives before it will store anything.

Data transfer using cassette tape is comparatively slow — 120 characters per second — but the BBC interface is robust, if primitive. Like other aspects of the computer, the QL design is theoretically attractive; the hard questions are to do with practical reliability and the Microdrive's cost effectiveness.

I think I would still hesitate to trust information that affected my livelihood to the QL Microdrives without the most careful backup procedures. Floppy disc manufacturers quote the expected error rates for storage and retrieval of information and the uncorrected false read/write data rates are better than one bit in 10 gigabits and the floppy and hard disc interfaces now on the market for the Sinclair QL will make the computer more attractive.

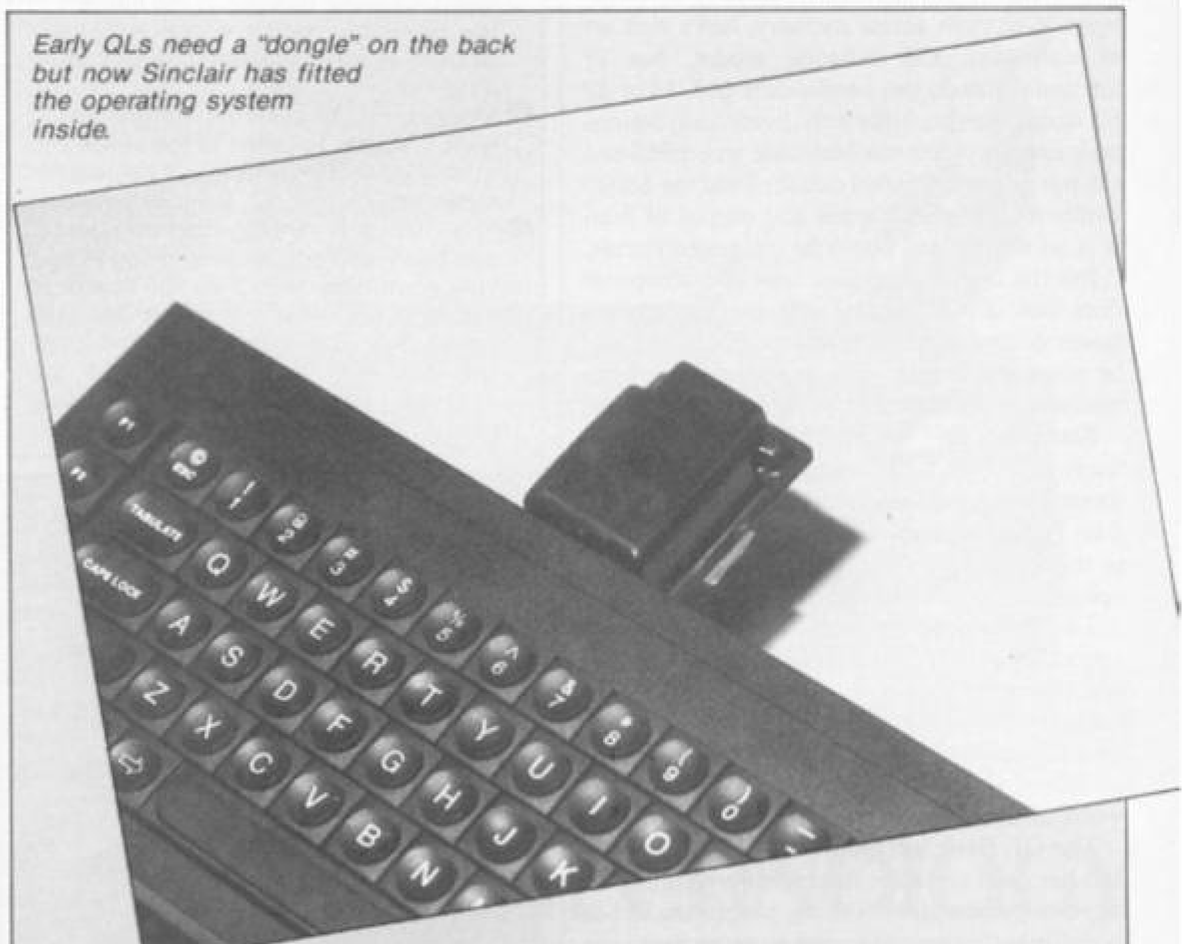
However, the additional cost will bring the QL close to the Apricot F1 purchase price and starts to whittle away at the BBC price differential.

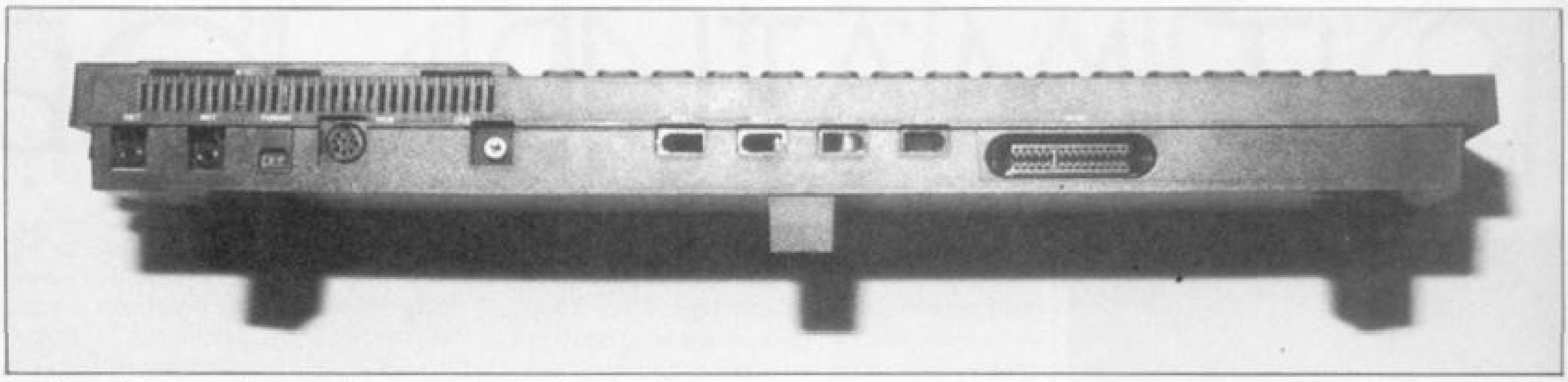
The QL screen display on a monochrome monitor is very good. The image is stable and lower case letters such as q, y, g and j have descenders which are two rows deep — the BBC characters are one row deep — and are easy to read. The spacing between lines is good. The operating system adjusts the screen format between 80 and 64 characters for display on a monitor or a television.

The graphics resolution may be set to either 255 by 255 pixels with eight colours, or 512 by

(continued on next page)

Early QLs need a "dongle" on the back but now Sinclair has fitted the operating system inside.





(continued from previous page)

255 pixels and four colours. However, it is possible to produce stippled or mixed colours which increase the complexity of the graphics effects considerably.

The QL is lighter than the BBC Micro and this can be attributed, in part, to the use of more recent, and more sophisticated integrated circuits. The memory chips in the QL are 4164 ICs — 64 Kilobits — set against the 4816 ICs — 16 Kilobits — in the BBC. Similarly, the QL uses two microprocessors and a number of ULAs — Uncommitted Logic Arrays.

The weight of the chips themselves is immaterial; it is the clustering of more functions into a single chip that matters. Reducing the "chip count", with consequent effects on the size of the printed circuit board, the number of associated components, and the smaller case, is the factor that contributes to the lighter, but more powerful, machine.

"More powerful" is a statement that needs careful examination. The Motorola 68000 central processor unit is an extremely powerful integrated circuit that is used now in some very expensive commercial computers. UNIX, the suite of programs that looks to have a good chance of becoming the next standard commercial operating system, runs happily on the 68000 series of microprocessors.

The CPU itself can address directly 16 megabytes of random access memory, has a rich set of addressing and indexing modes, has 17 internal registers, can handle data as 8, 16 or 32 bit words, has multiply and divide instructions built into the chip's machine-code repertoires and can use cheap integrated circuits from the 68000 family for peripheral input and output of data. It is an elegant and powerful integrated circuit.

But the central processor unit of a computer does not determine the effective computing power delivered by the machine. The CPU may be strangled by poor design of the rest of the machine or smothered by badly written software.

Remember that the BBC Micro uses the relatively old 6502 CPU and yet BBC Basic performs calculations faster than almost any other 8 bit microcomputer. The BBC's success is owed to the stunningly clever design of the machine operating system and the Basic interpreter.

The Basic interpreter in the QL does not operate as quickly as the BBC Micro despite the raw power locked up in the 68008 CPU. It is the software that you buy or write for a computer that unleashes the power. Without instructions to follow, the most powerful computer in the world is a useless, dead thing.

The QL Basic interpreter is well thought out and has good syntax or structure for helping you to solve problems by writing programs. But it is unlikely that you will want to write your own communications program, adventure or arcade style games, home accounts programs and so on. The range of software for the QL is still quite sparse and this, I think, is the most serious criticism of the computer taken as a whole.

Four programs are supplied with the QL. The first versions operated slowly but these have been replaced with a new issue 2.0. Sinclair has operated an exchange scheme for the earlier programs.

Quill is a powerful wordprocessor with very sophisticated on-screen formatting, good file handling and good control over the printer. Its search and replace facility is fairly basic but overall Quill is an effective and friendly piece of software. Two other programs — Abacus, a spreadsheet and Archive, a database — complete the three most used pieces of software in office work.

Abacus has all the usual facilities that are regarded as essential in a good spreadsheet program and, in addition, you can use labels to identify rows, columns or single cells. It is far easier to build a model when you can refer to "December.Materials" or "Temperature.5 Gallons/hour" rather than to "A24" or "V17".

Archive is a form of database programming language with which you can create procedures to enter, manipulate and print information according to your requirements. The manual says that it is possible to build relational files as well as the simpler card indexes. Archive is similar to dBase II in terms of the commands — there are 65 instructions — and although it is not possible to create a number of indexes to a database, Archive has a large potential.

Easel, the fourth program from Psion, is a clever business graphics package which will take data and present it in different ways. You can display pie charts, bar and line graphs on the screen and the program will dump the screen image to one of several printers included in the printer driver.

All the Psion programs have an excellent "Help" facility which loads detailed information from the program cartridge about any of the functions in the program. Data can be exported from any of the programs to any of the others. These two features, assistance on screen and integration of the data used by all the software, would make the Psion software outstandingly good value if you had to buy it. Given away with the machine, it is clearly the main reason why many people buy the QL.

But if you want to play games or demonstrate some scientific theory such as the reflection of sound waves from a concave surface, it's a different story. It is almost impossible to buy programs for the QL from W H Smiths and similar high street chain stores and even the pages of specialist magazines offer very little apart from a terrific chess program.

While the QL is well supplied with languages — APL, BCPL, Forth, Assembler, C, Lisp, Pascal, Fortran are all available from one company or another — it has not attracted the huge programming effort that went into its predecessor. ■

CONCLUSIONS

- It's the software that controls how useful or entertaining a microcomputer will be for you. I am never impressed by the fuss and bother that surrounds 16 bit micros. Software for eight bit machines is still only beginning to scratch the surface of the profitable and/or socially valuable uses to which microcomputers can be put.
- Most computer systems mature during their lifetimes in terms of the range and quality of software that will run on the machine.
- The Psion software bundled with the QL has been markedly improved and is now very good. That will cover the business needs of the great majority of the QL's users. But there is a virgin market for all the fun programs that helped the Spectrum to take off, provided that they can be delivered quickly.

Below: The QL keyboard — "better than the Spectrum".



LIGHTMAGIC GRAPHICS DESIGNER



£14·95

Lightmagic is the ultimate graphic design package giving you the ability to create stunning graphics and complete illustrations at your fingertips.

Now you can produce and edit complete screens and pictures. Use Lightmagic as a fascinating program in itself or as an exciting new dimension in your games and programming.

Just look at these features!

*Fully integrated screen editor and UDG designer.
*Drawing with pens.
*Painting with brushes – 10 different effects in 20 sizes.
*Illustrating with airbrush.
*Cut and paste facility.
*Lettering in upper and lower case characters, also double height facility.
*User Defined Graphics – Choose from 147 pre-set graphics or define your own.
*UDG Designer for creating and editing up to 7 sets of User Defined Graphics.
*Facilities to mirror, invert, copy, move, enlarge, fill, rotate, etc.

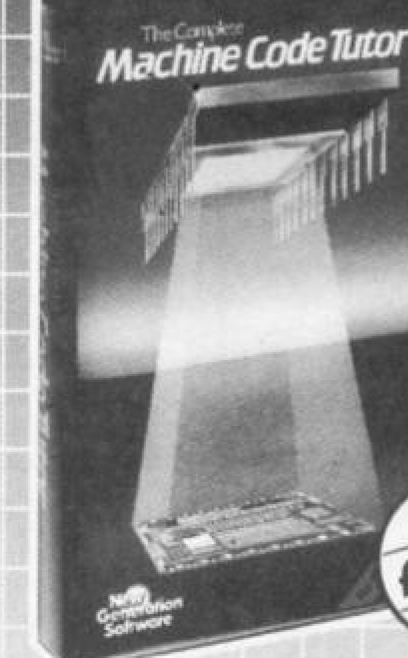
A comprehensive manual with worked examples, gives you a step by step guide to Lightmagic through every stage of screen composition.

Full facilities are provided for tape storage of finished pictures and UDG's, together with a temporary memory storage facility.

So enter Lightmagic and start designing today!

For 48K Spectrum and Spectrum +

The Complete Machine Code Tutor



NOMINATED FOR MICRO COMPUTING BRITISH AWARDS 1985

£14·95

Specially written for BASIC programmers finding the prospect of machine code rather daunting!

Now there's a straightforward way to learn all about machine code and its many applications.

Here are just a few of Machine Code Tutor's many features:

*A complete machine code tutorial on two cassettes with up to 100K of data depending on machine type.
*Between 27 and 35 progressive lessons depending on machine type.
*Full explanatory simulator – displays relevant registers and flags and their effect on the processor.
*Runs a series of exercises for continuous assessment of your progress which can be modified or substituted.
*No matter how much you experiment the safeguard system prevents crashing of the program.
*Automatic error checking.
*All machine code instructions are dealt with throughout the program and in the accompanying manual.
*Comprehensive reference manual.

Machine Code Tutor really is the most complete instructor around. Learn from your computer rather than a book, and do it at your own pace.

Using the tutor you should be confident of writing complex machine code programs by the time you finish your last lesson.

For 48K Spectrum and Spectrum + Commodore 64 BBC Model B 32K Atari AND NOW Amstrad CPC 464

New Generation Software

Lightmagic and Machine Code Tutor are available from all good stockists, or direct by filling in the coupon below and returning to: New Generation Software Ltd., FREEPOST, Bath BA2 4TD. For instant despatch phone your order now on 0225 316924 quoting your Access or Barclaycard number.

GSH

Please send me ______ Lightmagic(s) at £14.95 each, and ______ Machine Code Tutor(s) for the ______ Computer at £14.95 each. P&P FREE.

I enclose my cheque/postal order made out to New Generation Software Limited for £ ______ Cheque/Postal Order No. ______

Name ______ Address ______

Card No. ______ Signature ______ New Generation products are sold according to their terms of trade and conditions of sale.

Access VISA

YC/8

QUEST Corner

NEWS

o a e o
r s s u
t t t t
h h

The crystal ball

Radar Games of Dudley have released Confidential, a graphics and text adventure where you step into the world of a private investigator. Available now for the Spectrum and soon for the 64 and Amstrad, Confidential will be reviewed next issue.

A helping hand

Keith Foreman of Rugby has almost completed Colossal Cave but wants answers to the following:-
1. What should I do with the magazine "Spelunker Today"?
SUNO BARO FDNES TTIW TATI EVAE L
2. Where is the Pirate's chest?
a) NMUL OCEG NARO RAEN SEGA SSAP "EMA S" OF EZAM NI
b) UOYB ORET ARIP EHTT ELTS RIFU OYLI TNUT IDNI FT'N OWUO Y
3. Are the carpet and curtains in the Soft Room significant?
TIGN IKAE RBTU OHTI WNOE SAVE HTGN IPPO RDRO FYLN O

For the first time in any home computer magazine, here's some hints for owners of Infocom's new and utterly brilliant Hitch Hiker's Guide to the Galaxy:-
Robot grabbing the Babel Fish?
LENA PFOT NORF NILE HCTA STUP
Bugblatter Beast spotting you?
LEWO TEHT HTIW DAEH RUOY REVO C
Problems with the Vogon Captain's poetry recital?
YRTE OPYO HNE: NOIT AICE RPPA RUOY WOHS TSUM UOY
Yours in dungeons and danger,
Hugo North.

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

Tracer Sanction

- *Commodore 64*
- *Activision*
- *£9.95 Disc only*

YOU'RE THE highest ranking agent of the Stellar Intelligence Agency (SIA) and have been assigned to capture the Wing, the most notorious criminal in the galaxy.

You begin in SIA HQ on the planet Mongo facing a sinister gent in sunglasses. Trying to take his shades away only results in getting slapped. And that's one of the good things about this adventure — you can examine and experiment with many of the objects and still get a sensible response.

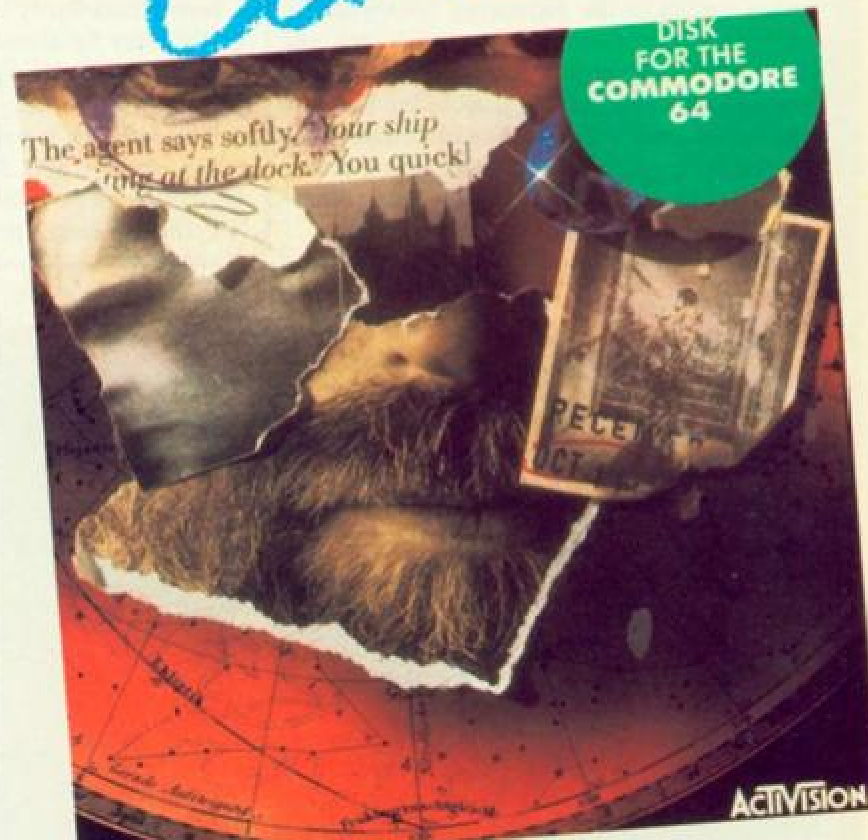
Your spaceship is nearby — you'll need to buy fuel and a map of the galaxy. On the planet Sonex, a long line of people waiting at the Tourist Information Centre might snooker you. Waiting politely in line gets you nowhere fast — the queue moves slowly and people keep barging in.

Puzzles abound. A bartender is in a daze and having trouble remembering anything — a clear-cut case of amnesia. A ragged hermit gets hot under the collar if he catches you swiping a solar battery from his shack. Stalactites are none too secure — one false move and you're in danger of becoming a kebab.

Further into the galaxy, a neat "sword in the stone" puzzle may baffle you and an unsociable chap will try to shake you off a suspension bridge. In a park, an old gentleman feeding the pigeons tells you to "Get off my turf, crumb." Old age pensioners aren't what they used to be. If you're not careful, he'll whip out a magnum .45 and say "Go ahead — make my day." Of all the pensioners in the parks in all the galaxy, you have to pick on Dirty Harry's grandad!

The graphics are particularly good, a hi-res picture for every location. Some are animated — the rolling eyes of an angry hermit, a soaring fountain, and a flowing river for example. There's a wide vocabulary and response time is fast.

The Tracer Sanction is an enjoyable, medium-complexity adventure with several original wrinkles.



The Tracer Sanction

Bored of the Rings

- *Spectrum*
- *Delta 4*
- *£4.95 cassette, £6.95 Microdrive*

A MITE WEARY of Middle Earth lookalike adventures? Browned off with Baggins dopplegangers? Then this large (three-part Quilled game's the perfect antidote; it blows a gust of irreverent air right through the Shires.

Bored of the Rings is a delicious send-up of you-know-what. The author, Fergus McNeil, has done a superb job. Text is presented in an impressive character set, using green, blue, grey and white to splendid effect. There are some graphics but it's in the prose where the adventure excels.

Fag End, your uncle Bimbo Faggins house, bears a startling resemblance to a certain location in another adventure — does a round green door ring a bell? As you enter, you'll hear Grandalf in conversation with Bimbo: ". . . and so we'll need to get some dense lemming to take it and dump it where old eyeball can't get it." "But what stupid individual can we get for a suicidal folly such as this . . ."

As Fordo, a boggit, it won't be long before you're joined by a large company. Do these names sound vaguely familiar: Spam, Pimply, Murky, Legoland, Aragont, Borrower and Giblet? Later, there's a delightful sideswipe at the famous vending machine that appears in the classic Crowther and Woods adventure.

Eating some magic beans has a strange side effect: Fordo sees a squadron of pink elephants flying past, pursued by brightly glowing traffic wardens., "Coroner's verdict: overdose".

This is an extremely funny adventure. If you like a good laugh then get this at once. It's only available by mail order (048 93 5800) and deserves to be a massive success. Excellent.

Assassin

- *BBC B*
- *Robico Software*
- *£9.95 tape, £11.95 disc*

JUST ROOM for a brief mention of Assassin, a machine code text adventure. It has a fairly sophisticated command parser that allows input of a more complex nature than the usual verb plus noun.

Using text compression techniques, the game offers over 220 locations to explore, many characters to meet and a host of puzzles to solve. The game comes attractively packaged and includes an adventurer's notebook and card entitling you to help should you get stuck.

WELCOME TO Birdy, a challenging Spectrum machine-code game for anyone — though it's no longer than 6.5K, it runs on 48K models only.

You are the humble but brave little Birdy — a Birdy being a rare breed of penguin, very fond of ice, but you won't find him being friends with an Uglie.

Birdy likes adventure. And that's the reason why you'll find him collecting diamonds on the frozen wastes of the Jupiterian Southpole.

There is only one slight problem: the extremely high gravitation on this planet. Normally it would be impossible for Birdy to take the enormous diamonds with him, but the gravitation is eliminated by a levitation power that arises from a combination of three of these precious stones in a row.

That's why he must push the diamonds over the icefields in order to join three of them.

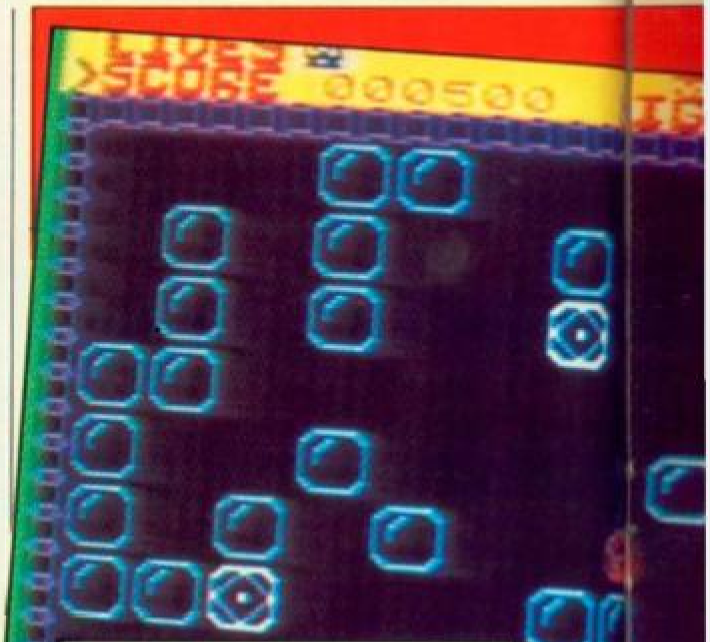
This would be simple if there weren't any Uglies in the neighbourhood . . . These nasty tomato-like creatures don't like Birdy taking away their diamonds, so beware those fellows!! Lucky for our hero, they are not too intelligent.

To help the Uglies to The Other World Birdy can squeeze them with one of the numerous blocks of ice lying around in the screens.

Sometimes Birdy can, for a while, make an Uglie dizzy by activating the electric fence — that means punching it — when such a nasty creature is wobbling along it.

If an iceblock is pressed by Birdy but it can't move, then it will fall to dust. Note that an Uglie cannot be killed by a sliding diamond.

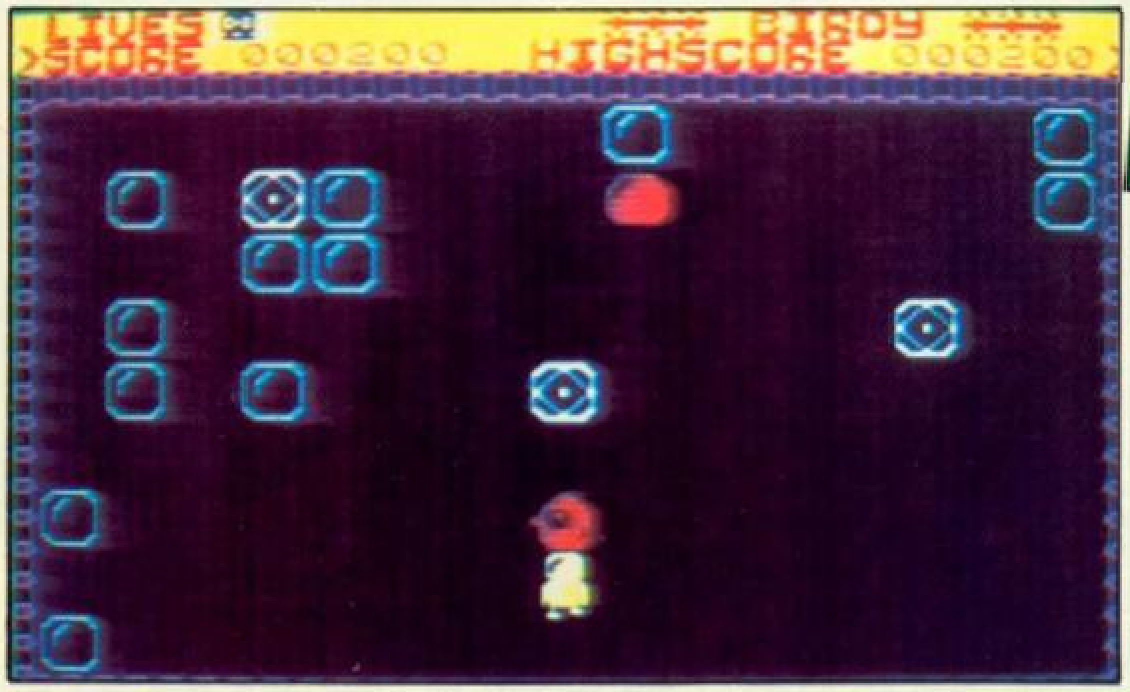
Points are scored for squeezing the Uglies and





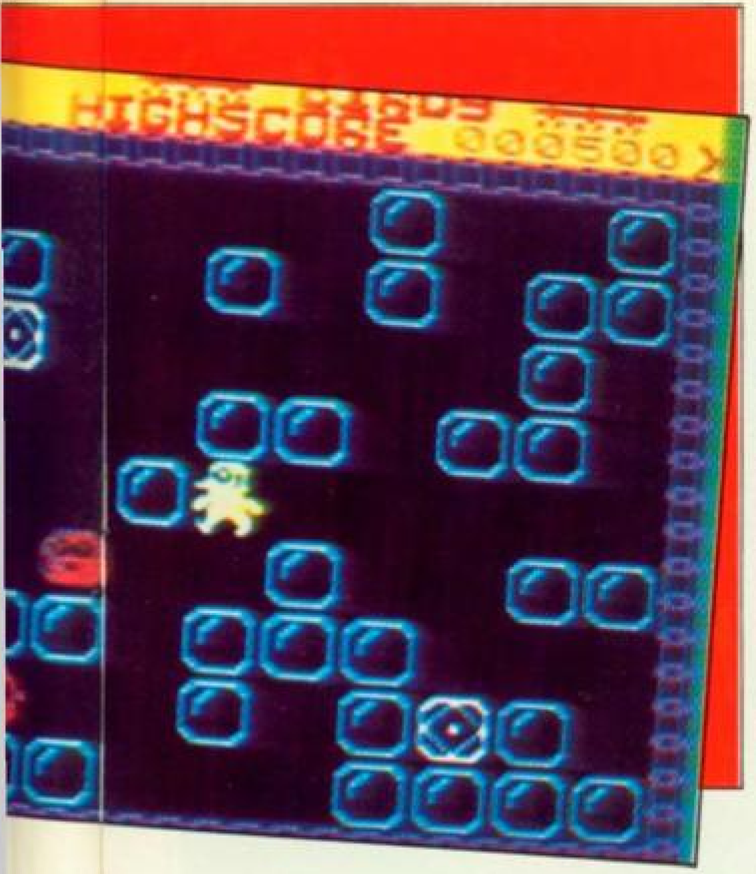
This ticl
availa le c

BIRD



Listing 2.

```
 10 GO TO 540
 20 INK 7: PAPER 1: BORDER 3: C
LS : SAVE "BIRDY-CODE"CODE 49536
,6520
 30 PRINT "** VERIFY (YES/NO)?"
 40 IF INKEY$="N" THEN RETURN
 50 IF INKEY$<>"Y" THEN GO TO 4
0
 60 PRINT '' FLASH 1;"** PLEASE
 PLAY THE TAPE"
 70 VERIFY "BIRDY-CODE"CODE 495
36,6520: PRINT ''"VERY WELL!!":
PAUSE 25: RETURN
 80 INK 4: PAPER 0: BORDER 1: C
LS
 90 PRINT '': FLASH 1:"** START
 YOUR RECORDER.."
 100 LOAD "BIRDY-CODE"CODE 49536
,6520
 110 PRINT ''"** GOOD OLD QUALIT
Y!": PAUSE 25: RETURN
 120 INK 0: PAPER 7: BORDER 4: C
LS
 130 LET a=10: LET b=11: LET c=1
2: LET d=13: LET e=14: LET f=15
 140 PRINT "** Type number of FI
RST block   to enter ";: INPUT b
eg: PRINT beg: IF beg<>INT beg O
R beg<0 OR beg>101 THEN GO TO 14
0
 150 PRINT '"** Enter number of
LAST block   to enter ";: INPUT
end: PRINT end: IF end<>INT end
OR end<beg OR end>101 THEN GO TO
 150
 160 PRINT '"You want to enter b
lock ";beg;: IF beg<end THEN PRI
NT " to ";end
 170 PAUSE 50: CLS
 180 RESTORE : FOR n=1 TO beg: R
EAD sum: NEXT n
 190 FOR n=beg TO end: READ sum
 200 PRINT "TYPE IN: BLOCK ";n:
PRINT
 210 INPUT LINE b$
 220 PRINT b$
 230 IF b$="QUIT" THEN RETURN
 240 IF LEN b$=128 THEN GO TO 26
0
 250 PRINT : PRINT FLASH 1;"* YO
U MADE A MISTAKE, TRY AGAIN!"':
GO TO 200
 260 FOR g=1 TO 128: LET k=CODE
b$(g): IF ((k>=48) AND (k<=57))
OR ((k>=65) AND (k<=70)) THEN NE
XT g: GO TO 280
 270 GO TO 250
 280 BEEP .1,12: BEEP .1,-12: LE
T t=0
 290 FOR G=0 TO 63
 300 LET v=16*VAL b$(2*g+1)+VAL
b$(2*g+2): POKE 49536+n*64+g,v
 310 LET t=t+v
 320 NEXT g
 330 IF t<>sum THEN PRINT ' FLAS
H 1;"* CHECKSUM ERROR, TRY AGAIN
!!!": PRINT : GO TO 200
 340 PRINT "O.K. "'"-------------
---------------------------"'
 350 NEXT n
 360 RETURN
 370 INK 0: PAPER 6: BORDER 2: C
LS
 380 PRINT AT 3,11;"* MENU *"
 390 PRINT AT 8,3;"1  -   ENTER
HEX-CODE";AT 10,3;"2  -   SAVE B
YTES";AT 12,3;"3  -   LOAD BYTES
"
 400 PRINT AT 20,2; FLASH 1; BRI
GHT 1; INK 4; PAPER 7;"* PLEASE
MAKE YOUR CHOICE *"
 410 LET K=CODE INKEY$-49
 420 IF NOT K THEN GO SUB 120: G
O TO 370
 430 IF K=1 THEN GO SUB 20: GO T
O 370
 440 IF K=2 THEN GO SUB 80: GO T
O 370
 450 GO TO 410
 460 REM * DATALINES'-CHECK *
 470 LET T=0
 480 RESTORE
 490 FOR N=0 TO 101
 500 READ D: LET T=T+D
 510 NEXT N
 520 IF T=621249 THEN RETURN
 530 BEEP .7,24: BEEP .7,0: BEEP
 1.5,-48: PRINT FLASH 1; BRIGHT
1; INK 4; PAPER 0;"* ERROR IN DA
TALINES. AAARG!!": STOP
 540 CLEAR 49535: POKE 23658,8:
GO SUB 460: GO TO 370
 550 DATA 2509,2526,5528,3573,73
51,5984,5935,1947,7339,7193
 560 DATA 7634,6688,5529,6769,69
09,8803,8058,7959,7481,7880
 570 DATA 7171,6493,7114,6137,72
92,7783,8658,7779,7341,7759
 580 DATA 6018,6977,5997,5910,75
26,7706,6708,7023,5986,7426
 590 DATA 7113,8351,7609,8180,82
33,5474,6377,9340,7924,7699
 600 DATA 8183,7802,5787,5561,75
79,6809,7375,7380,7423,7116
 610 DATA 7191,6743,7454,6950,68
23,6976,7089,6405,8721,7477
 620 DATA 5615,5692,5032,5491,59
56,2785,549,2722,3068,2643
 630 DATA 1324,3320,3673,3742,36
71,2454,3318,3491,4198,4049
 640 DATA 1394,584,6161,4344,411
9,6814,7096,7325,7115,6672
 650 DATA 5938,6571
```



his article is
ailable on Telsoft.

DY

E Verlind and
A and R Revesz with
a challenging game
for the Spectrum.

for placing the three diamonds in a row. The latter will give you the greatest number of points. Reaching 5000 points will be rewarded with a bonus-Birdy.

You can control your Birdy with a Kempston joystick or with cursor-keys. For playing the game only the four directions are used: pressing zero — or fire — will cause a break that enables a player to return to Basic. Please note that we can't guarantee the machine code won't crash if restarted after a return to Basic!

Take two blank tapes: one for the program itself and another for the saving of the hexloader and the bytes as far as typed in.

Enter listing 1 — the loader program that draws a loading message on the screen — and then loads the entire machine code block. Save this one to tape 1 after having entered it.

Now type in the hexloader — listing 2. It's safe to save this one to the other tape before starting to work with it. After this is successful, the nicest part of the job has to be done: typing in the hexdump.

First Run the hexloader, you will see a menu now: select the input-option. As you have probably seen already, the code is divided into 102 blocks of 64 bytes (=128 characters=4 lines), numbered 0 to 101. If you are at this point for the first time, type 0 for the number of the first block to enter.

Have a little patience

If you know what the last block you'll enter today is, type it when the Spectrum asks for it, otherwise simply enter 101. Then you have to do the real work.

Please have a little patience after having entered a block: the computer checks your input and that takes a little time.

We think that you won't type all in in one go: if you want to stop entering code type Quit when your machine asks for the bytes of a block: you will see the menu again.

Choose save to save the code to a tape and please remember the number of the last block you entered. Next time, Run the hexloader again, choose the load option and continue entering until you've finished it all. Save the complete code after the loader — listing 1. The game is now ready to be played!

We really hope you like this game and we think you will, but we can also imagine that you don't want to enter 6.5K of code. If so, you can send a letter to us Dutchies and we'll send you a copy on cassette. Please send £3 with your letter. For that you'll receive a Birdy copy with a beautiful loading-screen drawn by Alex and we also pay the postage overseas for sending the tape. Our address is: "Birdy", E. Verlind and A. + R. Revesz, Waalstraat 3, 7333 JR Apeldoorn, The Netherlands.

Listing 1.

```
  10 REM ****************
  20 REM **** BIRDY! ****
  30 REM ****** BY ******
  40 REM ** E. VERLIND **
  50 REM ** A. REVESZ  **
  60 REM ** R. REVESZ  **
  70 REM ** MAY 1985 **
  80 REM ****************
  90 INK 7: PAPER 0: BORDER 0: C
LEAR 49535: GO SUB 210
 100 PRINT #0; 1985 VERLIND & RE
VESZ BROTHERS"
 110 INK 0: PRINT AT 0,0;: LOAD
"BIRDY-CODE"CODE 49536,6528: POK
E 23606,128: POKE 23607,192: POK
E 52983,128: POKE 52984,2: POKE
53012,65: RANDOMIZE USR 50048
 120 READ D$: LET L=0
 130 PRINT AT Y+L,X;
 140 PRINT CHR$ (CODE D$(1)+63);
: LET D$=D$(2 TO ): IF D$(1)="@"
 THEN RETURN
 150 IF D$(1)="*" THEN LET L=L+1
: LET D$=D$(2 TO ): GO TO 130
 160 GO TO 140
 170 LET Y=3: LET X=2: INK 6: GO
 SUB 120
 180 LET Y=9: LET X=12: INK 5: G
O SUB 120
 190 LET Y=16: LET X=2: INK 4: F
LASH 1: GO SUB 120: FLASH 0
 200 RETURN
 210 INK 2: BRIGHT 1: LET P$="**
******************************";
 PRINT AT 21,0;P$: PRINT AT 2,0;
P$: DIM P$(32): LET P$(1)="*": L
ET P$(32)="*": FOR Y=3 TO 20: PR
INT P$: NEXT Y
 220 BRIGHT 0: GO SUB 170: PLOT
15,48: DRAW 225,0: DRAW 0,-32: D
RAW -225,0: DRAW 0,32: RETURN
 230 DATA "AAAAMMMAEMMIMMMAMMIAI
AEIAAAA*AHLAFMNCAFKAPAFKPAHIHMLA
AHLA*BHLCPAFKAFKAPDPAPANCAPAABHL
C*ADDADDDABDDCDABCDDCAADAAADDA@"
 240 DATA "EMMIEMMA*AFKAHMMA*AFK
AMAFK*BDDCBDDA@"
 250 DATA "MAAAEMMAEMMAMMIAEMMIM
AEIEMMA*PAAAFAFKPAFKPAHIAFKAPOFK
PABC*PAAAPAFKPDHKPANCAFKAPBPKPBH
K*DDDCBDDADABCDDCABDDCDABCBDDA@"
 260 REM * U-CASE LETTERS'
```

Hexdump.

```
BLOCK 0
00000000000000000C1C1C1C1C001C18
006666440000000000247E24247E2400
0C7F7F6C7F0D7F7E00626400810264600
3020301030647E300E0E1C0000000000

BLOCK 1
060E101010100E0E30300C0C0C0C3030
266610FFFF106664000C1C7F7F7F1C10
000000000000E0E1C000003F7F7E0000
00000000000C1C100103070E1C307060

BLOCK 2
3F7F676073637F7E3C7C6C0C0C0C7F7E
3F7F431F7C607F7E3F7F431E1F437F7E
26666666667F7F063F7F607F7F037F7E
3F7F607F7F637F7E3F7F070E0C0C1C18

BLOCK 3
3F7F637F7F637F7E3F7F637F7F037F7E
0C1C1C00001C1C100C1C1C001C1C3C38
030E1C38301C0E02003F7F7F007F7F7E
181C0E07070E1C303F7F63660C000C00

BLOCK 4
9FB1E0CED09C909E3F7F63637F7F6362
3E7F637E62637F7E3F7F636060637F7E
3E7F676363677F7E3F7F607C7C607F7E
3F7F607C7C6060403F7F63606F637F7E

BLOCK 5
2363637F7F6363623F7F1C1C1C1C7F7E
1F3F030363637F7E23666C70786C6662
3070707070707F7E377F7F6B6B636362
2363737B6F6763623F7F636363637F7E

BLOCK 6
3F7F63637F7E60603F7F63636B677F7E
3F7F63637C7F67663F7F607F1F437F7E
3F7F7F1C1C1C1C182363636363637F7E
2363636363673E1C236363636B7F7762

BLOCK 7
2163361C183C67422363637F7F037F7E
3F7F060C18307F7E0000000000000000
00000000000000000000000000000000
00103054101010000000000000000000

BLOCK 8
ED7382D43E01327ED43E02CD0116CD47
D13E033256D4AF3200D4FB3E01D3FECD
32D30E46CD4FD33E4000CD8CD23ECDCD
01D3FD365546013100115 4D6CD3C203E

BLOCK 9
F7D8FEF6FC2FFE0028F53D327FD43E01
3267D4AF3257D4329ED5329FD532A0D5
181CFE0020A82157D47EFE0420033418
0D36003A67D4FE0920043C3267D421AC

BLOCK 10
D411ADD40109003610ED802100D7227B
D43E04CD9B22AF3270D4326FD4CDC7C9
CD83CA215BD4360F23360D215AD43601
233600CD11CBCDBECBFBCDB8D0CD77CC

BLOCK 11
AF2158D4772B773A7FD4FE002827AFDB
1FFE103045E60FFE0028DFFE01200177
FE02200236FF23FE0420023601FE0020
2C36FF18283EF7DBFECB67200236FF3E

BLOCK 12
EFDBFECB572002360123CB5F200236FF
CB67200236 01CB472003FBCF147E2BAE
FE012004FEFF2092110C003E01BE2002
1E04238E20021E083EFFBE20021E0021

BLOCK 13
BCD4191160D47E124723137E1223137E
124F23137E123A58D4815F3A59D480CD
E6D33264D4082158D43A63D4865F233A
61D486CDE6D33265D4470000FE402805

BLOCK 14
CD22C5181A2158D45E237ECD84D32158
D4115AD41A867713231A8677CD11CBC3
3AC43A5AD4FE002005CD11CB180D2177
65FE012003216F67CD68CB3A64D4FE36

BLOCK 15
CAD0C8FE503805FE64DA0CCE3A65D4FE
503805FE64DA0CCE2158D43A5AD48786
325ED45F233A58D48786325FD4CDE6D3
FE42CAC6C7FE46C0AF3266D4215ED43A

BLOCK 16
62D4865F233A60D486CDE6D3FE20203C
215ED43A63D4865F233A61D486CDE6D3
FE2020200100FA0378B120FB2A5ED4CB
7ACD84D3215ED43A5AD48677233A5BD4

BLOCK 17
8677CD7DCB3E013266D418B0FE643004
FE4F30623A66D4FE01C800CDEDC50100
F00378B120FB3A5FD4CD84D3C93A5ED4
4F3A5FD42E3ECD85D33A5FD43C2E3CCD

BLOCK 18
85D300FE002018010A1921FF00110A00
C5D5E5CD8503E1D1C17D916F10F2FB3A
5ED44F3A5FD42E3ACD85D33A5FD43C2E
38CD85D359C92A5AD4226DD4215ED43A

BLOCK 19
60D48786326BD400233A6ED48786326C
D406FF210DD4DD21A1D40423DD235FAF
DDBE007B20F4BE20F1EB21F6FF1900BE
280400EB10E4783269D42A6BD43A62D4

BLOCK 20
855F3A60D484CDE6D3FE2020320100FA
0378B120FB3A5ED45F3A5FD4CD84D301
6BD4115ED4216DD40A86021A86120313
230A86021A8612CD7DCBCD44CC18BBFE

BLOCK 21
643017FE4C3813ED486BD42A69D4EB21
84D41971110A001970C92A69D4EB21A2
D41936403A81D4FE0020113A67D42100
00110001193D20FCEBCD41D03A5ED45F

BLOCK 22
3A5FD4CD84D3215ED43A6DD48677233A
6ED48677CD7DCB215FD43A6ED4FE0028
333A60D486326CD4216BD44E2E4DCD85
D3216BD45E236E165826002929292929

BLOCK 23
19AF060000000010FBD3FE772C772D3D
20F018447E3255D4283A62D4863254D4
11785ECD68D32155D4341E70CD68D33A
55D43D6F3A54D45F1658260029292929
```

(continued on page 56)

THE LOW COST COMPUTER FOR HOME AND BUSINESS ·

If you know anything about computers you'll know that disc drives are up to fifty times faster than cassette when you're loading and saving programs. In fact, a disc drive makes computing faster, more reliable, more efficient and more fun. But up till now the only way to gain these advantages for a home computer was to buy a separate disc drive attachment. Now Amstrad are pleased to announce the first complete home computer with built-in disc drive: The Amstrad CPC 664.

And when you buy a CPC 664 you'll find it's not just the disc drive that's built-in.

You'll get everything you need, including a monitor (green screen or full colour). We'll even give you a free CPM and Logo disc, so all you do is plug in and you're in business.



WITH COLOUR MONITOR AROUND

· £449 ·



WITH GREEN SCREEN AROUND

· £339 ·

THE HOME COMPUTER THAT MEANS BUSINESS.

BUSINESS OR · PLEASURE ·

Although a disc drive will make games more fun (and there are loads of them to choose from) it also makes the CPC 664 a serious proposition for the business user.

There are accounting, word-processing, spread-sheet and data-base programs (to name but a few).



Amsoft Business Control, is a complete suite of programs for integrated sales invoicing, stock control and sales ledger for around £99. (Requires an additional FD-1 disc drive around £159 and DL-2 cable around £7).

The CPC 664 is also supplied with CP/M* to help make your business more efficient and effective by providing access to the famous range of CP/M* software.

HIGH PERFORMANCE · LOW COST ·

The one thing you won't need a computer to work out is that the Amstrad CPC 664 represents outstanding value for money.



Wordprocessing with Amsword can improve the productivity of everyone from unskilled typist to trained secretary. ***Around £23.95.***

You only have to check the cost of buying all the elements separately (64K computer, disc-drive, monitor) to realise that the Amstrad package is very hard to beat.

With a green screen monitor the cost is just £339. With a full colour screen it costs £449. And after you've saved money on the price of the computer itself, you go on saving on the price of software.

There are hundreds of programs for business or pleasure available on disc (and cassette) to CPC 664 users. Many from Amsoft, others from other famous-name software houses. Few will cost you more than £49 and most will cost you considerably less.

AN EXPANDING · SYSTEM ·

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 programs on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

· AMSTRAD USER CLUB ·

Join the optional Amstrad User Club and we'll keep you informed with our monthly user magazine, and information on all software as it is introduced. Your membership details will be recorded on your personal club card, which entitles members to various privileges and offers.



Figure analysis made easy with Microspread. An easy to use spreadsheet with pull-down menus and a wide range of mathematical options. Around £49.



Please send me more information

Name ____________________

Address ____________________

____

____

Amstrad CPC 664

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EF.

YC/664/2

*CP/M is a trademark of Digital Research Inc.

SPECTRUM · W.H. SMITH · WIGFALLS · AND GOOD INDEPENDENT COMPUTER STORES ·

(continued from page 53)

BLOCK 24
2919E5DDE1AF060000000010FBD7FEDD
7700DD7720DD20EE3E04D3FE3A5ED45F
3A5FD4CD84D3216DD4115ED41A861223
131A8612CD7DCB2168D4343A67D43CBE

BLOCK 25
C0E1AFC3E2C30600A5ED4DD21B6D47D
DDBE0020067CDDBE03280504DD2318EF
21730470215ED43A62D4865F233A60D4
B6CDE6D3FE202031215ED43A63D4865F

BLOCK 26
233A61D486CDE6D3FE20201D2A5ED45D
7CCD84D32A5ED4EB2A5AD47C82677D83
6F225ED4CDB3CB1B8BDD21B6D4ED5B73
D4DD193A5ED4DD7700 3A5FD4DD7703DD

BLOCK 27
21B9D4DD7E00DDBE01200BDDBE022006
DD21B6D41813DD21B6D4DD7E00DDBE01
C00DBE02C0DD21B9D4DD7E00DDBE0130
09DD4601DD7701DD7000DD7E00DDBE02

BLOCK 28
3009DD4602DD7702DD7000DD7E01DDBE
023009DD4602DD7702DD7001DD7E02DD
3600FE04C0110020CD41D0E1CD0ED1AF
C3E2C3215ED40E47CD16D4215FD47E2B

BLOCK 29
3E2E42CD85D33A5FD42C2E40CD85D3C9
3A70D4FE0020 2FCD99C92167D44604DD
2184D4C5AFDDBE1E2017DDBE142B12DD
7714DD7E00326BD4DD7E0A326CD4CD44

BLOCK 30
CCC1DD2310DD3A5AD4FE01281 0FEFF20
043E021808 3A5BD42FCB2FC604DD2184
D43270D4FE03300DFE013E012002 3E1D
3271D41800FE033E0320023E133272D4

BLOCK 31
2167D4460421 70D44EC5AFDDBE1E203B
79FE03300E3A71D4DDBE00202E5FDD56
0A180C3A72D4DDBE0A202057DD5E00D5
6A0EC4CD19D4D14B7A087A2E53CD85D3

BLOCK 32
083C2E51CD85D3DD361401C1DD2310B9
CD99C93E40326FD4C92140583A70D4FE
033013FE01200 22E5F11200006143E00
AE77191 0FCC9FE03200321A05A06203E

BLOCK 33
08AE772C10FCC9CD32D10E45CD4FD33E
04D3FE21C05A3E20772C20FC21065081
71087 12C10FC2E4011A05A3E43062077
122C1C10FA112000DD2160580612DD77

BLOCK 34
00DD771FDD1910F6FD365572013F0011
C205CD3C2021404 0DD21A0500E2011B0
D8E5CD7CD311B0D0DDE5E1CD7CD3E12C
DD230D20E9DD2154D4DD3601030612C5

BLOCK 35
DD3600001 1B0D0CD6 8D3DD36001F11B0
D8CD68D3DD3401C110E5CD9BCB110000
CD41D00E013E032E46F5CD85D32E44F1
3CF5CD85D3F13CFE1538EC0C0C79FE1F

BLOCK 36
38E3C9DD21CCD43A57D4FE0028081124
00DD193D20F80E031E017BE607FE0720
09DD7E00E603DD2318 00ED44C60747DD
7E000F10FDE603FE0020 00D579CDB4D3

BLOCK 37
D11821FE02201D4169D50E47CD19D4D1
4879C5C52E424BCD85D3E17D3C2E40CD
85D359C11C1C7BFE1F380 0DD230C0C79
FE1538A42100053A57D4FE0020081106

BLOCK 38
00193D20FC0606111 86D47E1223 1310FA
C92158D40E46CD16D43A5AD4FE00202D
473A5CD4FE02200 93EFF325CD40E0118
053C325CD44F78FE0120092E6F7987C6

BLOCK 39
696710242E777987C67167181B3A5DD4
2FC6023 25DD44F3A5BD4FE012E7F2802
2E7B79 87C6796 73A5BD44F3A59D4E5
CD85D33A59D43CFE16CCD85D3C9215ED4

BLOCK 40
0E45CD16D43A5ED44F3A5FD42E46CD85
D33A5FD43C2E44CD85D3C9010E0011FD
D5FD365571CD3C203A5Ed4FE00C00E06
2E7F00AFCD85D30C0C0 03D20F3C9AF32

BLOCK 41
6BD406202184D4772310FC3269D4CDE0
CB3A67D4473A69D4B8D03C3269D418EE
CD2ED47AE61FF601FE1E30F44FCD2ED4
7AE61FF601FE0 38E7FE1430E347C559

BLOCK 42
CDE6D3C1FE2020 D83A59D490FEFB3010
FE06300C3A58D491FEFB3004FE0630C0
2A69D411B4D41971110A00197 0ED436B
D4CD2ED4216DD43601 3EB00A300236FF

BLOCK 43
CD44CCC9216BD40E42CD16D43A6DD4FE
00200 587C6591 0063A6ED487C6616FD6
02673A6BD44F3A6CD4ECD85D33A6CD4
3CE16CCD85D3C9AF3269D4216FD4BE28

BLOCK 44
01253A69D4EB21A2D419AFBE20133511

F6FF1977C2EBCDCDE0CB2160D435C3EB
CD2184D4197E326BD4218ED4197E326C
D42198D419AFBE280F3A6FD4FE00C2EB

BLOCK 45
CD3600CD44CC180C21ACD419AFBE2804
35C3EBCDCD2ED4216DD47AE603FE0230
0007 3D7723360018 07360023 87D60577
2B110C003E01BE2002 1E0423BE20021E

BLOCK 46
003EFFBE20021E0021BCD4191160D47E
124723137E122 3137E124F23137E123A
6BD4815F3A6CD480CDE6D3326 4D4FE36
20A2470870FE47302FFE4330 20CD2ED4

BLOCK 47
7AFE400 2E8CD2A6DD4ED5B6BD47CB782
325FD47D8703325ED4CDEDC53A5FD4CD
B4D3CD44CCC3EBCD216BD43A63D4865F
233A61D486CDE6D3326 5D447004F80FE

BLOCK 48
40200C3E63B0DA0CCEB9DA0CCE185C21
6BD43A6DD4865F233A6ED48657D53A62
D4B35F3A60D482CDE6D3D1FE20203C3A
63D4835F3A61D482CDE6D3FE20202C3A

BLOCK 49
6BD45F3A6CD4CD84D3216BD4116DD41A
8786774F13231A8786772A69D4EB2184
D41971 21 0ED41977CD44CC2169D43A67
D4BE2804 3C3 82CC3A70D4FE00C83A6F

BLOCK 50
D4FE00C0CD99C9AF3270D4C9E1213533
CD60CB21ACD411ADD4362001 0900EDB0
0E002158D4CD16D40600790 0D3FE10FA
0D20EF2156D4E535CD9ECBE1AFBE3800

BLOCK 51
CD4ECE3E01C3E2C3CD11CBC33AC4CD32
D1CDF3CFDA5FCFC50E32CD4FD3FD3655
9F0136001 10D6CD3C202155D43600 21
D007118C00CD85D3FBAF3276D43E4132

BLOCK 52
75D43A76D4C60E3254D43A75D407260F
6F2929EBCD68D33A7FD4FE00281CDB1F
E613FE01200 43E3E181AFE0220043E35
1812FE1020E03E30180A21085C36007E

BLOCK 53
FE0028FBFE3820040601 1806FE35202F
06FF3A75D480FE212004 3E411812FE1F
20043E5A180AFE5 82004FE4020023E20
3275D4215000114F00CD8503FB1803FE

BLOCK 54
3 0C202CE2178D4ED5B76D4193A75D477
21A6071114 00CD8503FB2176D47EFE02
280434C37DCEDD21B2D5F1FE0230174F
000603DD7EFDDD7700DD7E0CDD770FDD

BLOCK 55
2810F00D20EB21A0D5117AD406037EDD
77001ADD770F2B1B0D2B10F2CD32D30E
4FCD4FD33E4 70CDBCD23EF0CD01D301
13001141D6FD3655F2CD3C200601DD21

BLOCK 56
54D4DD36010721B3D5DD36000 570C5E5
878787C6805F163DCD68D3DD3600 0BE1
060 3E5C57E07260F6F2929EBCD68D3C1
E123DD3401 0E0E5DD3600141 1EEFF19

BLOCK 57
CD1DD0E1C10470FE06300BDD3401DD34
0118B60100000 7B0B120FB3A7FD4FE00
20093EEFDBFEC8472 0F8C9AFDB1FFE10
30F9C9110300DD21A4D5060 53A9ED5DD

BLOCK 58
BE003013C03A9FD5DDBE0130 0AC03AA0
D5DDBE022801D0DD1910E137C9060 67E
CB40280823E60F87870710 03E6F00FC6
805F163DE5CD68D3C1E1DD340 10DF

BLOCK 59
C9DD219ED57BDD860227DD77023 00114
7ADD8601 27F5FE5038133A00D4FE0020
0C3E013200D42156D434CD9BCBF1DD77
01DD7E00CE0027DD7700603DD7E03DD

BLOCK 60
BE003006DD2310F41810DD219ED50603
DD7E00DD7703DD2310F6DD2154D4DD36
0101DD36000 7219ED5DD2154D4CD1DD0
21A1D5DD36001 9CD1DD0C9217ED43EFD

BLOCK 61
D0FE61FFE1F20013 4CB4620 12DD2A7B
D4DD66 00DD23DD6E00DD237DB4200F01
002A0B7B0812 0FB2100D7227BD4C91600
DD5E00DD233A7DD4FE003E01327DD428

BLOCK 62
00AF327DD4DD227BD4CD8503FBC9DD21
B6D7DD66007CFEFF2002FBC9DD6E01DD
5E021600DDE5CD8503DDE1010300DD09
18E0160821 00400E18CB3E2CC239D124

BLOCK 63
0D20F61520EEC93E06CD9B22CD32D30E
46CD4FD3FD3655CC1185D6010 700CD3C
203E01320 1D42100A0225ED4DD215ED4
CD7DCBDD36000CCD7DCBDD3601ECD7D

BLOCK 64
CB210A0C225ED4CDB3CBDD360110CDB3
CBDD3601 12CDB3CBFD3655D7110CD601
1300CD3C2021005A364F11015A017F00
ED80FD36554F119FD6011500CD3C20FB

BLOCK 65
0650 2610FD3F013 25AD4325CD4325DD4
21000A2250D43E0032AED2CD9DD22177
A5FD60CBAF0021 0A0A225ED4CDEDC53E
0A32AED25FCDB4D3CD9DD221000122 6D

BLOCK 66
D4DD7 16DD4DD36001CDD360100CD44CC
FB767676767676DD7E01FE0A3000DD34
01DD5E00CDB4D31BE411C7D60105 00CD
3C20FD36554D11B4D6011300CD3C20FB

BLOCK 67
0650 2610FD217765CD60CBC3E0C325ED4
CD7BC5FD3655F211CCD6011300CD3C20
FD36554F11DFD6010500CD3C20FB0630
7610FD21000 1225AD4CD11CB1E0A3E0C

BLOCK 68
CD84D3210A0E225ED4CDB3CBFB3E0606
5076D3FEEEFB10F9AF3201D4C9DD2158
D4CD11CB767676767676DD7E00FE08D0
5FDD7E01CDB4D3DD3400 18E5AFF56F26

BLOCK 69
00225 4D4086F00CD5CD3F1F56F261722
54D4086F00CD5CD3F13CFE2030DFAFF5
672E002254D4086F00CD5CD3F1F5672E
1F2254D4086F00CD5CD3F13CFE1838DF

BLOCK 70
C9DDE52100 501101 5077011F00EDB021
E05A11E15A77011F00EDB0006 16DD2120
58112000DD7700DD771FDD190520F5DD
E1C9010040 110048210050AF0212770C

BLOCK 71
1C2CC23CD30414247CFE58C23BD3C921
00587 111015801FF02ED80C9CB252600
29291100D8151 9EB3A55D447E6186778
940F0F0F6F06403A54D44F0906081A77

BLOCK 72
132410FAC92DCB2526002929 1100D815
19EB47E6186778940F0F0F6F2C064009
E506081A7713241 0FAE12D06081A7713
2410FAC957E6186779 40F0F0F6F1640

BLOCK 73
19545D1CAF060 7712241410FA1120FF
7DFEE030031120F819545D1CAF060877
12241410FAC957E6186 77A940F0F0F6F
164019EB2100D00E60D5E506081ABE20

BLOCK 74
0A14231 0FBE1D13EB091C9E111000019
D10D20E5AFC95E236E16502600292929
292919712C711120001 9712D71C9DD21
0000ED5B765C13DD19EB29EBDD19EB29

BLOCK 75
29EBDD19EB292929EBDD19DDE5D11BED
53765CC90000000000000000000000000
00020200000000100000000000000000
0000000000000000000000000000000000

BLOCK 76
000000001C0000000000000000000A00
00000000000000000000000000000000
00000000000000000000000000000000
0000000000000000000000000FFFF0001

BLOCK 77
00010202020200010001FFFF00054004
1645555405441440550514905155145 0
510010500111514015164144140145 04
01440104110451141110501050045450

BLOCK 78
41404000455405145005150 0014401190
0055015445041000401455505654055 4
151555101550411005114444111 18444
0511414465555554555000144501550 4

BLOCK 79
44140044450544464542444441 55044
450001045555574540000142055540 0
0000000015151501910119015155150
000000000555400010001000 4111040

BLOCK 80
07190F0509110D0519070F1107110 307
0F130313190B0B110305190 30909000
00000000000000000000000000000000
00000042424249494952525244444459

BLOCK 81
5959160000204C495645531600112A2A
2A20424952445920 2A2A2A20 203E5343
4F52452030303030 20202040494740
53434F52452030303030303030 3E160006

BLOCK 82
20202020202020202020201602045553
45204C4546542C20524947485420 414E
44205A45524F1603043E544F20454E54
455220594F555220494E495449414C53

BLOCK 83
3C16020 0544F44415927532047524541
5445535416065 42495245459204741 4D
4520535454C4543544494F4E16 0D00A3120
4B4559424F4152441 60F0A32204B454D

BLOCK 84
5053544F4E16000E44454D4F16020142
52454148494E472052444845204943 4516
150053434F52453A2020202020205 04F
494E5453160201535 04C415420544845

BLOCK 85
2055474C49455316150832301 6020126
20504C41434520444941 4D4F4E445316
150732 30C390EA000000000000000000

00000000000000000000000000000000

BLOCK 86
066A1A0511200 43E2703C42803 0C2E03
C42804 3E27051120066A1A051120043E
2703C42803 0C2E03C42804 3E27051120
04C62203C42803263402CA3A02A13E02

BLOCK 87
CA3A03263403C42B066A1A051120043E
2703C42803 0C2E03C42804 3E27051120
043E27030 3723102CA3A0279410254450 2
794102CA3A0357310326340326340 30C

BLOCK 88
3E0726340000 07C55605CB5605CB3905
2540049 26D05CB5603D3AD0492400492
48044F4D03D32 0044F26049224044F26
03D3560525 2005CB1C0525200492240 5

BLOCK 89
354007C54005CB3905CB1C0525200492
4805CB3903D3AD04926D049240044F26
03D32004922 4044F260525 4005CB3905
CBE7FF00000000000000000000000000

BLOCK 90
00000000000000000101 01010001000
002424000000000000247E24247E2400
00003E283E0A3E000062640102 64600
0010201024443A000000100000000000

BLOCK 91
00040000000004000020101010102000
00014003E081400000000003E000000
00000000000000010000000 003E000000
0000000000101800000002040810 2000

BLOCK 92
003C464A52623C00001 01 8280000003E00
FEF7E3F7FFDFE3BE5F5F7F7B7B776E5D
848E0404042020 30EBA2CBAA0070404 0
E77E424242427EE70052048045100A45

BLOCK 93
0126413410C52095000000000000400A0
00000000000020015AAA6BE1264CF800
445448406038 1F0000F80C76024E9202
001F3264705359420 60A12224 60CF800

BLOCK 94
6150484462311F0000F80C4622120A86
001F31624448 50610202020 2060CF800
48404040603 01F0000F80C0602020202
001F3063464C4040 0F1E3C70F0E1C307

BLOCK 95
3333CCCC3333CCCC0000000000000000
00000000000000000000000000000000
FCFEF72337FFFEFC3F7FEFC4ECFF7F3F
E7E7A7BFBFDF7E3C3C7EFFDBA5A5DBFF

BLOCK 96
1737 8FFF7F7FFFFEEBECF1FFFEFEFF7F
0000401000F00C3604001 4 01001F316C
7CFCF4F4ECFBF000F1303F3F3F1F0F00
00C0E0F0F0FC7C7C0003070F1F3837F1

BLOCK 97
3F1CFCFCFCF8F0003E3F2F2F371F0F00
00C0E0F0F81CECBF0003070F1F3F3E3E
FEFEFEFEFCF000007F7F7F7F3F1F0000
0000F0F8FCFEFEFE0 0000F193 3676F6F

BLOCK 98
FE7E7EFEFCF000005F5E5E6F3F1F0000
0000F0F09C6E2E9E00000F1F39767479
F1FFFEF0E000000000D0B1B3B3F0F1B0D
B0D0D0DCFCF0D0B000FFF7F0F07010001

BLOCK 99
FCFEE6F07838103 03F776F0F0E2C3810
60F0F0F0D8C0E0C00F1E3D330F060C1D
A0A060E0F0F0000 0 2080B0A0D07 0107
E0F050500 0B0E0E0070C0B0091C7F0F0F

BLOCK 100
FCEEF6F07 0341C183F77070F1E1C180C
F078CCCF060300060F1F1F1B030703
D0D0D0500 0E0E0E0505060 70F0F0101
E030D090 30FEF0F0070F0A0A0D0D0707

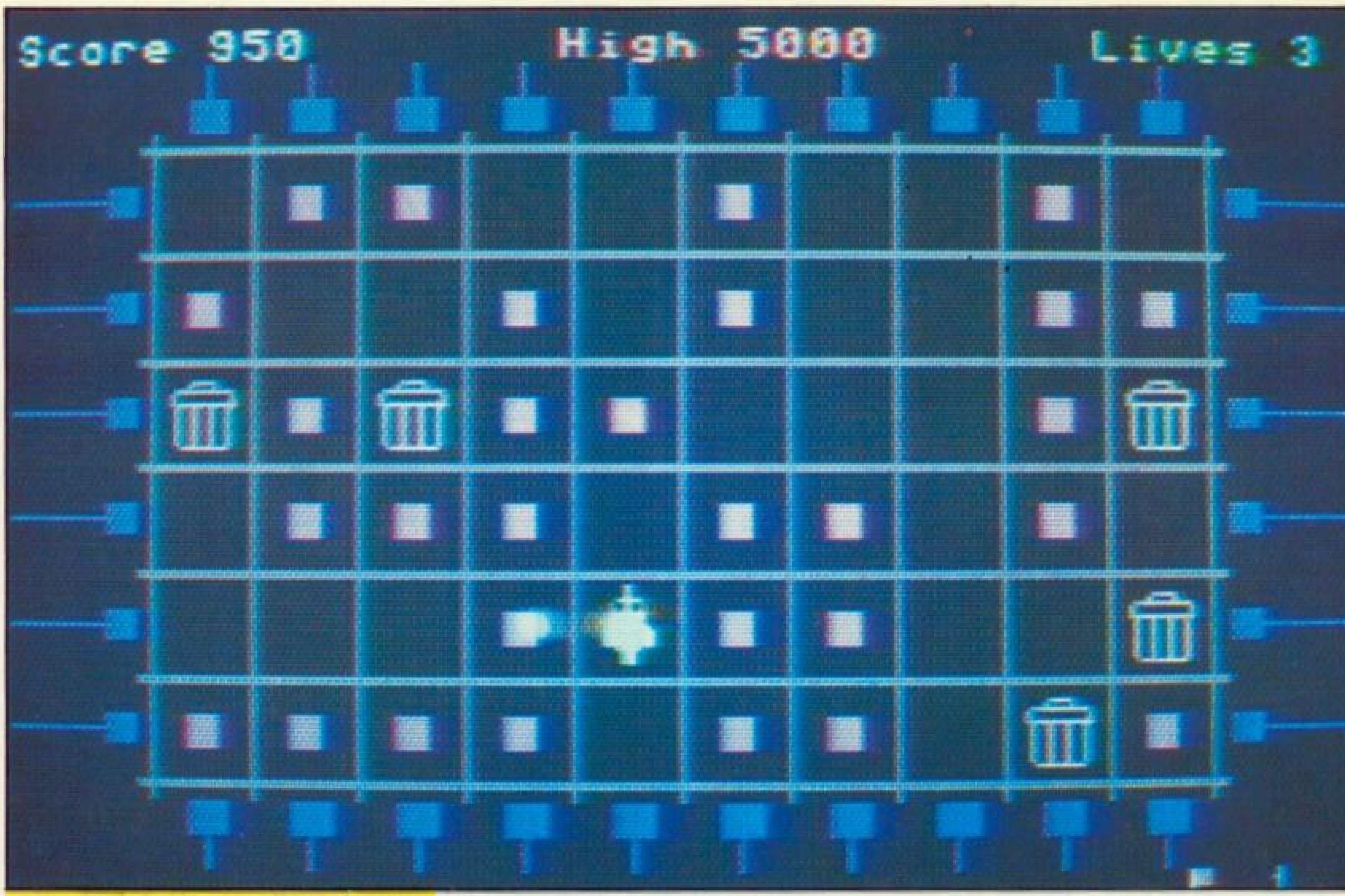
BLOCK 101
F9F0F0F0E0202070 1F1F1F1F17040E00
E0F0F0F0F0F0E0F00070C0909000 070F
F0F0F0F0E0B2070001F1F1F1F17040 40E
E0F0905090F060F0070F090A090F060F

BLOCK 102
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000

BLOCK 103
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000

BLOCK 104
30000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000

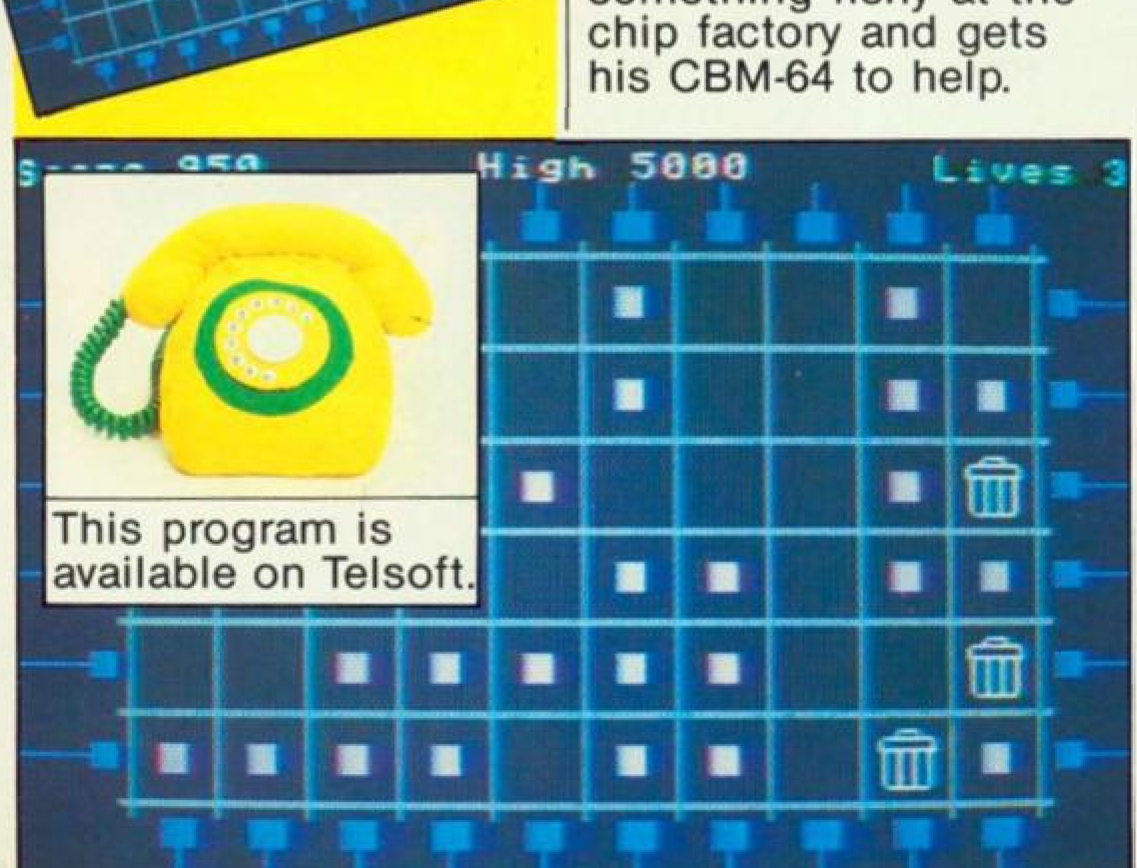
BLOCK 105
30000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000





IMPULSE

Keith Suddick finds something fishy at the chip factory and gets his CBM-64 to help.



This program is available on Telsoft.

SOMETHING HAS gone very wrong down at the chip factory — silicon chips that is, not fish and . . . — All of the memory circuits have started forgetting the data that they are supposed to be remembering!

In a desperate attempt to find out what has gone wrong and hopefully put it right, Floyd the droid has been miniaturised and put onto the surface of one of the faulty chips. The problem soon becomes obvious as the circuit is invaded by program bugs and data locks which roam across the chip, both trying to turn any data they find into garbage. As if the bugs and locks weren't enough, worse still are the sparks which shoot across the chip from the contacts on either side.

Floyd can destroy bugs

Luckily Floyd can destroy the bugs and the locks by firing packets of random data at them but nothing has any effect on the sparks. Add to this the fact that if Floyd is caught by any of his adversaries then his own circuits will be scrambled, and you can see that he might need some help!

At the start of each screen Floyd will appear in the top left hand corner of the chip, a joystick in port number 2 will control his movements and the fire button will fire a packet of random data.

The chip itself is organised as a 10 by 6 matrix of memory cells each able to hold a packet of data. The data is supplied to the chip from outside and is stored in any unused memory cell. Floyd will not harm the data in any way but if any of the other characters find any data then there is a good chance that they will interfere with it and turn it into useless garbage.

You start the game with three droids, scoring 50 points for each bug you destroy and 100 points for each lock, remembering that you cannot destroy sparks! Each screen is completed when the memory chip is full, including garbage, then you will score 10 points for every unharmed data packet retrieved from the chip.

Bonus of 100 points

Should you save 75 per cent or more of the data — 45 cells or more — then there is a bonus of 100 points per valid data packet. 10,000 points or more will earn you an extra droid.

On the first screen you will find only one bug to contend with but with each successive screen up to level 8 a different combination of enemies will appear. After level 8 the screens will cycle through the patterns for screens 5 to 8 but the degree of difficulty will be increased by speeding up the movement of the bugs. A small flag in the bottom right hand corner of the screen indicates the current level of play.

At its most difficult level the game uses all eight of the 64's sprites thus Basic by itself would not be able to support the game so the program makes use of several machine-code routines to deal with the animation of the characters and some of the otherwise lengthy operations. Unfortunately this generates a lot of data statements and requires quite some time to read them — although this is only done once when the program is first run.

It is, as always, the case that Commodore control characters such as cursor movements and colour codes, do not lend themselves to dot matrix printers followed by photographic reduction and although anyone who has used Commodore machines for any length of time, will probably have gotten used to them, I have tried to make things easier by including details of almost all the control characters used in the program in Remark statements directly after their use.

Don't type Rem statements

These remarks should not be typed — they will at best slow the program down slightly and at worst cause an out of memory error because I have placed the video chip data directly after the program area.

Table 1 describes the abbreviations I have used to explain the control codes. As usual, if you type the program then be sure to make a copy of it before you run it, if you would rather not type it then I can supply cassette copies for £2.50. Please write to: Keith Suddick, 6 Ravel Court, Jarrow, Tyne & Wear, NE32 3BW.

Table 1.

cd	cursor down	ron	reverse on
cu	cursor up	rof	reverse off
cl	cursor left	clr	clr
cr	cursor right	hm	hm
blk	ctrl + 1	org	G + 1
wht	ctrl + 2	brn	G + 2
red	ctrl + 3	lt.red	G + 3
cyn	ctrl + 4	gray1	G + 4
pur	ctrl + 5	gray2	G + 5
grn	ctrl + 6	lt.grn	G + 6
blu	ctrl + 7	lt.blu	G + 7
yel	ctrl + 8	gray3	G + 8
s/	shift + the following character		
c/	ctrl + the following character		
=/	G + the following character		

Numbers if present indicate the number of repetitions:
e.g. 4s/* means 4 shifted asterisks.
15cd means 15 cursor down.

Program breakdown.

0-90	Initialisation for the program, game and screen respectively. Sets top of memory, sets up video and sound chips ready for game.
100-210	Main program loop. Fills screen with data packets, checks status of bugs etc. and either removes them or generates a new one as required.
300-310	Makes beep and hiss sounds respectively.
400-600	Generates details of new bugs, locks and sparks respectively.
700-790	Deals with the loss of a droid. Flashes Floyd sprite and either begins the screen again or ends the game depending on how many droids are left.
800-860	Plays fanfare at the completion of each level.
1000-1999	Draws the chip and the rest of the game screen, blanking the screen during drawing.
2000-2040	Generates at random the positions on the chip that the data packets will fill. This is only done once at the start of each screen to save time.
4000-4280	Called at the completion of each level to collect data from the chip and award points and bonuses as required.
5000-5010	Adds points onto current score, updates high score if needed and prints new values on the screen.
6000-6080	Game over message, gives options to play again or review the instructions.
8000-8080	Initialise title string and displays "please wait" message.
8100-8120	Dimensioning of arrays.
8200-8270	Initialise constants for future use.
8300-8320	Initialise strings.
8400-8490	Read data into arrays and memory as required. Call machine code routine to reset the video bank and access the character set.
8500-8550	Calculate array elements for use in generating new characters.
8900-8999	Installs IRQ routine vector and calls instruction routine, then starts the game.
9000-9140	First screen of instructions.
9160-9290	Second screen of instructions.
9700-9710	Sets up the video chip with requested data.
9800-9820	Flashes sprites during instructions.
9900-9990	Prints instructions, waits for space bar then clears the screen.
10000-10090	Video chip set up data.
11000-11090	Animation data.
12000	Colour codes.
13000-13050	Data for machine code initialisation routine.
14000-14030	user defined character data.
15000	Sound chip set up data.
16000-16470	Sprite data.
17000-17410	Data for other machine code routines.

```
0 poke56,60:clr:run8000
1 lv=0:tl=0:nf=3:gp=.05:ex=1000:goto8760
10 pokeic,.:vu=.:gosub9700:gosub2000:gosub1000
20 dv=(lvandc3)-c4*(lv>c3)
30 forx=0to15:pokesc+16+x,i%(x):pokesc+x,a%(dv,x):next
40 forx=0to24:pokesi+x,n%(x):next
50 sf=60-c4*int((lv-c5)/c4):ifsf<32thensf=32
60 rd=60-lv:ifrd<.thenrd=.:gp=.7
80 pokeaf,sf:pokese,u:pokeic,u:pokefk,.
90 i=fre(0)
100 printleft$(vt$,asc(y$))tab(asc(x$))da$
110 x$=mid$(x$,c2):y$=mid$(y$,c2):di=c4+rnd(.)*du:ifx$=""then4000
130 di=di-u:ifdi<.then100
140 forx=2to7:ifpeek(sc+x)=.thensys s0,x:xd=sd+x:gosub180
150 next:ifrnd(.)>gpthensys s9
160 ifpeek(fk)then700
170 goto130
180 ifpeek(xd)=14thenpokexd,15:s=50*(u-(x>c3)):gosub310:goto5000
190 xc=sc+x:ifpeek(xd)thenpokexd,.:pokexc,c5+rnd(.)*rd:return
200 onxgosub0,400,400,500,500,600,600
210 pokexd,nd:sys s4,sx,sy,x:sys s1,x:pokexc,nc:ff=gf+(xoru)*c2:goto300
300 pokef2,ff:pokev2,wb:pokev2,wb+u:return
310 pokev3,wn:pokev3,wn+u:return
400 p=int(rnd(.)*hr):sx=hx(p):sy=hy(p):nd=hd(p):nc=ht:pokemc+x,hh:return
500 p=int(rnd(.)*dr):sx=dx(p):sy=dy(p):nd=dd(p):nc=dt:pokemc+x,dd:return
600 p=int(rnd(.)*vr):sx=vx(p):sy=vy(p):nd=vd(p):nc=vt:pokesp+x,vv-(p<10):return
700 pokeic,.:pokese,u:pokesi+19,12:gosub310:pokesi+12,0:pokesi+13,244
710 fori=1to31:pokesp,iandxor64:ford=1to25:next:next:print"[ctrl chars]"
711 rem                                         ↑ clr
720 pokev2,wb:pokef2,12:pokev2,wb+u:ford=1to400:next:pokev2,wb
730 pokef2,6:pokev2,wb+u:ford=1to400:next:pokev2,wb:ford=1to300:next
740 ifexthenift1>exthennf=nf+1:ex=.
750 pokese,.:nf=nf-1:ifnf=.then6000
760 print"[ctrl chars]"spc(213)t$:printtab(15)"[ctrl chars]———————"
761 rem    ↑ clr 2cd                    ↑ cd blu 11s/*
770 printtab(16)"[ctrl chars]Get ready":printtab(15)"[ctrl chars]———————"
771 rem          ↑ grn                    ↑ blu 11s/*
790 goto10
800 pokev1,.:pokev2,.:pokesi+12,.:pokesi+5,.:pokesi+13,247:pokesi+6,247
810 forx=1to2
820 pokesi+u,20:pokef2,40:pokev1,17:pokev2,17
830 ford=1to340:next:pokev1,16:pokev2,16
840 pokesi+u,30:pokef2,60:pokev1,17:pokev2,17
850 ford=1to340:next:pokev1,16:pokev2,16
860 ford=1to100:next:next:return
1000 print"[ctrl chars]":pokebf,.:pokebb,.:pokede,11
1001 rem    ↑ clr c/n c/h
1010 print"[ctrl chars]":forx=0to5:printtab(4):fory=0to9
1011 rem    ↑ clr 2cd gray1
1020 print"[ctrl chars]";:next:print"[ctrl chars]":next
1021 rem    ↑                                         ↑ 2cd
1022 rem    ↑ s/* 2s/* s/* 2(cd 4cl [illegible] s/* 2cr s/-) cd 4cl s/* 2s/- s/* 3cu cl
1030 print"[ctrl chars]Score"tl;tab(16)"[ctrl chars]High"hi;tab(31)"[ctrl chars]Lives"nf
1031 rem    ↑ hm gray3              ↑ lt.red            ↑ grn
1100 print"[ctrl chars]"tab(6):forx=0to9:print"[ctrl chars]";:next
1101 rem    ↑ hm cd blu                 ↑ =/9 cd 2cl ron =/k =/n rof cu 2cr
1110 print"[ctrl chars]":forx=0to5:print"[ctrl chars]"tab(35)"[ctrl chars]":next
1111 rem    ↑ hm 3cd                    ↑                ↑ =/n cu cl =/i 3=/@ 2cd
1112 rem                                ↑ 3=/@ =/i cd cl =/n
1120 printtab(5):forx=0to9:print"[ctrl chars]";:next
1121 rem                                ↑ ron =/i =/n rof cd cl =/9 cu cr
1130 print:printtab(33)"[ctrl chars]"lv+1"[ctrl chars]"
```

(continued on next page)

(continued from previous page)

```
1131 rem                    ↑ cd grey3 =/n red =/v grey2
1999 pokede,27:return
2000 x$="":y$="":j=rnd(-ti)
2010 forx=0to9:fory=0to5:i=int(rnd(.)*len(x$))
2020 x$=left$(x$,i)+chr$(x*c3+c5)+mid$(x$,i+u)
2030 y$=left$(y$,i)+chr$(y*c3+c5)+mid$(y$,i+u)
2040 next:next:return
4000 pokeic,.:pokese,.:pokesi+12,3
4010 lv=lv+1:qs=10:c4$="Data   ":ff=150
4030 qd=.:fory=0to5:forx=0to9:cp=p0+x*c3+y*c3*40
4040 q=peek(cp):ifq=129then4080
4050 qd=qd+1:printleft$(vt$,c5+c3*y)tab(c5+c3*x)"  ■■■  ■":gosub300
4051 rem                                                  ↑ sp cd 2cl 2sp grey3
4060 printvt$c4$qd"■ x"qs"■ ="qd*qs"■"
4061 rem              ↑ cl    ↑ cl       ↑ hm
4070 gosub5000:ifqd=45thenqd=.:qs=100:c4$="Bonus  ":ff=160
4080 printvt$"        ■":next:next:ford=1to500:next
4081 rem          ↑ 5sp hm
4200 pokese,.:print"■■"spc(213)t$:printtab(13)"■■■────────────────
4201 rem                ↑ clr 2cd                      ↑ 2cd blu 15s/*
4210 printtab(14)"■Completed"int((qd-45*(qs>10))/60*100)"■%"
4211 rem                ↑lt.red                                 ↑cl
4220 printtab(13)"■────────────────":gosub800:ford=1to800:next
4221 rem                ↑ blu 15s/*
4230 printtab(11)"■■■■────────────────
4231 rem                ↑ 3cu blu 19s/*
4240 printtab(12)"■Now try level "lv+1
4241 rem                ↑ grn
4250 printtab(11)"■────────────────
4251 rem                ↑ blu 19s/*
4260 ifexthenift1>exthenof=of+1:ex=.
4290 goto10
5000 tl=tl+qs:print"■■■■■■■"tl:iftl>hithenhi=tl:printtab(20)"■"hi
5001 rem                ↑ hm grey3 5cr                                    ↑ lt.red
5010 return
6000 print"■■Score"tltab(16)"■High"hi
6001 rem     ↑ clr grey3          ↑ lt.red
6010 print"■"spc(172)t$:printtab(10)"■■■────────────────
6011 rem     ↑ clr                          ↑ 2cd blu 19s/*
6020 printspc(11)"■G A M E   O V E R":printtab(10)"■────────────────
6021 rem                ↑ yel                                   ↑ blu 19s/*
6030 printtab(5)"■■■Press the fire button to play
6031 rem                ↑ 2cd grn
6040 printsp$:printtab(6)"or return for instructions.
6050 pokesi+24,.:pokeic,.
6060 ifpeek(197)=1thengosub9000:print"■■■■■■■":goto6030
6061 rem                                          ↑ hm 6cd
6070 ifpeek(jp)and16then6060
6080 goto1
8000 poke53280,0:poke53281,0:poke198,0
8010 t$="■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■"
8011 rem↑red 3=/i org 2=/i yel 2=/i grey3 =/i yel 2=/i org 2=/i red 3=/i cd 15cl
8020 t$=t$+"■■ I ■■ ■■ ■■■ L■ S■ E  ■■■■■■■■■■■■■■■■■■■■■"
8021 rem      ↑ ron [colours as 8010] ↑ rof cd 15cl
8030 t$=t$+"■  ■  ■  ■■ ■  ■  ■      "
8031 rem      ↑ [ as 8010 but =/v not =/i ]
8040 print"■■■"spc(172)t$:printtab(10)"■■■■────────────────
8041 rem     ↑ clr c/n c/h                        ↑ blu 3cd 19s/*
8050 printtab(11)"■■y  Keith Suddick
8051 rem                ↑ lt.red
8060 printtab(10)"■──────────────────":printspc(133)"────────────────"
8061 rem                ↑ blu 19s/*                             ↑ 13s/*
8080 printtab(13)"■ Please wait"spc(28)"■─────────────"
8081 rem                ↑ grn                         ↑ blu 13s/*
8120 deffnr(x)=int(rnd(.)*x)
8130 dimv%(2,46),s%(2,7),a%(7,15),i%(15),n%(24)
8140 dimdx(3),dy(3),dd(3),hx(11),hy(11),hd(11),vx(19),vy(19),vd(19)
8200 sb=20480:uc=19464:ir=32768:jp=56320:vc=53248:cs=37888:af=56325
8210 se=vc+21:ms=vc+16:sp=18424:sc=680:sd=688:ic=2:pokese,.:pokeic,.
8220 u=1:c2=2:c3=3:c4=4:c5=5:c9=9:14=15:15=31:18=255:b5=16:b9=256
8230 hi=5000:ex=2*hi:x0=60:y0=79:cz=24:mx=11*cz:my=7*cz:zx=x0-cz:zy=y0-cz
8240 ht=255:vt=84:dt=168:hr=12:vr=20:dr=4:hh=2:vv=72:dd=7:dw=40
8250 s0=33088:s1=33104:s4=33120:s9=33168:fk=171:cc=646
8260 rf=53280:sb=53281:de=53265:p0=17573:mc=vc+39:mv=28672
8270 si=54272:v1=si+4:v2=si+11:v3=si+18:f2=si+8:wb=64:wn=128:gf=15
8300 sp$="
8301 rem   ↑ 39sp
8310 vt$="■■■■■■■■■■■■■■■■■■■■■■■■■"
8311 rem   ↑ hm 24cd
8320 da$="■■■■■■"
8321 rem   ↑ pur =/d =/f cd 2cl =/c =/v
8400 fori=0to2:forx=0to46:readv%(i,x):next:next
8410 fori=0to2:forx=0to 7:reads%(i,x):next:next
8420 fori=0to7:forx=0to15:reada%(i,x):next:next
8430 forx=0to15:readi%(x):next
8440 forx=0to 7:readc(x):next
8450 forx=0to95:readn:pokemv+x,n:next:sys mv
8460 forx=0to31:readn:pokemc+x,n:next
8470 forx=0to24:readn%(x):next
8480 forx=0to767:readn:pokesb+x,n:next
8490 forx=0to668:readn:pokeir+x,n:next
8500 fori=0to3:dx(i)=zx+mx*sgn(iandc2):dy(i)=zy+my*sgn(iandu)
8510 dd(i)=c2/(u+sgn(iandu))+8/(u+sgn(iandc2)):next
8520 fori=0to11:hx(i)=zx-mx*(i>c5):hy(i)=zy+cz*(i+u)+144*(i>c5)
8530 hd(i)=8+c4*(i>c5):next
8540 fori=0to19:vx(i)=zx+cr*(i+u)+240*(i>c9):vy(i)=zy-my*(i>c9)
8550 vd(i)=c2*(i>c9):next
8560 forx=1to9:f1(x)=100+x*10:f2(x)=200-x*10:next
8900 poke56334,0:poke788,0:poke789,128:poke56334,1
8990 print"■■■■■":goto6030
8991 rem   ↑ 5cu
9000 vu=1:gosub9700:print"■"tab(12)t$
9001 rem                      ↑ clr
9040 print"■    * This is Floyd the droid, he has/
9041 rem    ↑ blk (yes black !)
9050 print"■  been miniaturised and programmed to/
9051 rem    ↑ cd [repeat on following lines]
9060 print"■  protect important data  * stored on/
9070 print"■  a faulty memory chip, from bugs * ./
9080 print"■  sparks  *, and locks  *  each ready/
9090 print"■  to corrupt the data turning it into/
9100 print"■  useless garbage  *  !               /
9110 print"■     Floyd can destroy bugs and locks/
9120 print"■  by firing packets of random data * /
9130 print"■  at them but sparks are deadly !    @
9140 gosub9900:vu=2:gosub9700
9160 print"■    Use a joystick in port number two/
9161 rem    ↑ blk
9170 print"■  to control Floyd and try to save as/
9171 rem    ↑ cd [repeat on following lines]
9180 print"■  much data as you can.   Each screen/
9190 print"■  is completed when the memory  chip/
9200 print"■  is full (including garbage.)       /
9210 print"■     Scores are as follows ...       /
9220 print"■    *   Locks...... 100 points       /
9230 print"■    *   Bugs.......  50 points       /
9240 print"■    *   Data.......  10 points       /
9250 print"■   Bonus 100 points for data over 75%■
9260 gosub9900
9290 return
9700 pokese,.:forx=0to7:pokesp+x,s%(vu,x):next
9710 forx=0to46:pokevc+x,v%(vu,x):next:return
9800 q0=peek(se):q1=q0*2+1:fori=1to5
9810 pokese,q0:ford=1to80:next
9820 pokese,q1:ford=1to80:next:next:return
9900 p=17530:pokese,0:c=0
9910 p=p+1:x=peek(p):d=2*2*2
9920 ifx=42thengosub9800:goto9910
9930 ifx=47thenp=p+40:goto9910
9940 ifx=32then9910
9950 c=(c+1)and7:ifxthenpokep+cs,1:pokep+cs,c(c):goto9910
9960 printtab(10)"■■Press the space bar.■
9961 rem    -          ↑ cd grey2               ↑ hm
9970 wait197,32:pokese,0:print"■■■■";
9971 rem                                   ↑ hm 3cd
9980 forx=2to22:printsp$:ford=1to50:next:next
9990 print"■■■■";:return
9991 rem     ↑ hm 3cd
10000 data60,79,60,79,,.,.........,0
10010 data0,27,.....200,0,19,......,0
10020 data,......,5,0,2,2,7,7,6,6
10030 data46,68,220,98,34,116,90,132,200,132,170,162,44,194,0,0
10040 data60,27,.....200,0,19,......,0
10050 data,......,5,4,2,6,7,12,1,0
10060 data40,160,40,180,40,190,..........,0
10070 data0,27,.....200,0,19,......,0
10080 data,......,7,2,6,.....,0
10090 data64,75,68,68,67,67,72,73, 64,74,69,72,67,66,75,0, 67,69,74,....,0
11000 data0,0,0,1,1,1,1,1, 0,1,0,128,128,128,128,128
11010 data0,0,0,1,0,1,1,1, 0,1,0,128,0,128,128,128
11020 data0,0,0,1,1,1,0,1, 0,1,0,128,128,128,0,128
11030 data0,0,0,1,0,1,0,1, 0,1,0,128,0,128,0,128
11040 data0,0,0,0,0,1,0,1, 0,1,0,0,0,128,0,128
11050 data0,0,0,0,0,0,0,1, 0,1,0,0,0,0,0,128
11060 data0,0,0,0,0,1,0,0, 0,1,0,0,0,128,0,0
11070 data0,0,0,0,0,0,0,0, 0,1,0,0,0,0,0,0
11090 data1,3,1,1,1,1,2,2, 0,0,1,1,3,3,1,1
12000 data14,4,10,8,3,13,5,7
13000 data120,165,1,41,251,133,1,162,72,169,0,133,251,134,252,162,216,133
13010 data253,134,254,160,0,177,253,145,251,200,208,249,230,252,232,224
13020 data224,208,238,165,1,9,4,133,1,173,136,2,133,252,169,68,133,254
13030 data141,136,2,162,4,177,251,145,253,200,208,249,230,252,230,254,202
13040 data208,242,173,2,221,9,3,141,2,221,173,0,221,41,252,9,2,141,0,221
13050 data169,19,141,24,208,88,96
14000 data7,12,127,192,192,255,102,102
14010 data224,48,254,3,3,255,102,102
14020 data102,102,102,102,102,102,102,63
14030 data102,102,102,102,102,102,102,252
15000 data0,6,0,0,0,8,0, 0,0,0,8,65,8,0, 0,140,0,0,0,10,0, 0,0,0,15
16000 data0,0,0,0,24,0,0,24,0,0,24,0,0,126,0,0
16010 data153,0,0,153,0,0,255,0,0,126,0,0,60,0,1,255
16020 data128,3,255,192,3,126,192,3,126,192,3,126,192,0,126,0
16030 data0,60,0,0,60,0,0,60,0,0,0,0,0,0,0,0
16040 data0,0,0,0,126,0,0,102,0,0,102,0,0,102,0,1
16050 data129,128,3,102,192,3,102,192,3,0,192,1,129,128,3,195
16060 data192,6,0,96,12,0,48,13,129,176,13,129,176,13,129,176
16070 data14,231,112,0,102,0,0,102,0,0,102,0,0,126,0,0
16080 data0,0,0,0,0,0,0,126,0,0,195,0,7,255,224,12
16090 data0,48,12,0,48,15,255,240,6,102,96,6,102,96,6,102
16100 data96,6,102,96,6,102,96,6,102,96,6,102,96,6,102,96
16110 data6,102,96,6,102,96,6,102,96,3,255,192,0,0,0,0
16120 data0,0,0,0,0,0,63,255,252,15,255,240,63,195,252,15
16130 data129,240,63,0,252,15,0,240,63,129,252,15,195,240,63,195
16140 data252,15,129,240,63,129,252,15,0,240,63,0,252,14,0,112
16150 data62,0,124,15,255,240,63,255,252,0,0,0,0,0,0,0
16160 data0,24,0,0,60,0,0,126,0,0,255,15,112,255,31,255
16170 data255,255,255,255,254,255,255,254,127,153,252,63,153,252,31,153
16180 data240,15,255,240,15,195,240,15,189,240,15,255,240,31,255,248
16190 data31,255,248,63,227,252,63,129,252,63,0,252,30,0,124,0
16200 data0,1,128,0,7,192,0,15,224,120,63,224,254,255,224,255
16210 data255,224,127,255,240,63,255,254,63,153,255,31,153,255,31,153
16220 data255,31,255,254,63,195,252,63,189,248,63,255,224,127,255,224
16230 data127,255,240,127,135,240,126,3,248,56,1,248,0,0,240,0
16240 data14,0,0,31,159,240,31,195,248,31,231,248,15,255,248,15
16250 data255,240,7,255,240,7,255,240,15,153,240,31,153,240,63,153
16260 data252,127,255,254,255,195,254,255,189,254,127,255,252,51,255,192
16270 data1,255,192,0,255,128,0,127,128,0,63,0,0,30,0,0
16280 data1,192,0,3,224,60,3,240,126,3,248,254,3,255,254,3
16290 data255,252,3,255,252,3,255,240,31,153,248,63,153,240,127,153
16300 data240,127,255,240,63,195,252,7,189,254,1,255,255,1,255,255
16310 data1,255,31,0,254,0,0,252,0,0,120,0,0,0,0,0
16320 data0,0,0,0,0,0,0,24,0,0,24,0,0,60,0,0
16330 data60,0,0,126,0,0,126,0,0,255,0,0,255,0,1,255
16340 data128,1,255,128,3,231,192,3,195,192,7,129,224,7,0,224
16350 data14,0,112,0,0,0,0,0,0,0,0,0,0,0,0,0
16360 data0,0,0,0,0,0,14,0,112,7,0,224,7,129,224,3
16370 data195,192,3,231,192,1,255,128,1,255,128,0,255,0,0,255
16380 data0,0,126,0,0,126,0,0,60,0,0,60,0,0,24,0
16390 data0,24,0,0,0,0,0,0,0,0,0,0,0,0,0,0
16400 data0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
16410 data0,0,0,0,0,0,255,0,0,255,0,0,255,0,0,255
16420 data0,0,255,0,0,255,0,0,255,0,0,255,0,0,0,0
16430 data0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
16440 data0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
16450 data0,0,0,24,0,0,126,0,0,255,0,0,255,0,0,255
16460 data0,0,255,0,0,126,0,0,24,0,0,0,0,0,0,0
16470 data0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
17000 data120,165,2,208,3,76,49,234,230,251,169,1,133,252,162,0
17010 data189,160,2,240,93,189,192,2,37,251,208,86,189,184,2,133
17020 data254,189,176,2,133,253,48,3,222,168,2,138,72,10,170,189
17030 data1,208,70,253,144,2,229,254,70,253,144,3,24,101,254,157
17040 data1,208,173,16,208,37,252,133,180,168,189,0,208,70,253,144
17050 data5,229,254,176,1,136,70,253,144,6,24,101,254,144,1,200
17060 data157,0,208,152,69,180,240,8,173,16,208,69,252,141,16,208
17070 data104,170,232,6,252,144,153,173,168,2,208,45,173,16,208,74
17080 data173,0,208,106,170,172,1,208,169,0,224,127,42,224,42,42
17090 data192,176,42,192,103,42,73,5,13,0,220,73,15,41,15,240
17100 data8,141,176,2,169,24,141,168,2,165,251,41,3,208,26,162
17110 data1,188,250,71,136,189,176,2,41,4,208,2,200,200,152,41
17120 data3,9,60,157,250,71,202,16,232,173,169,2,208,76,173,21
17130 data208,41,253,141,21,208,173,0,220,41,16,208,61,173,0,208
17140 data141,2,208,173,1,208,141,3,208,173,16,208,106,8,106,40
17150 data42,42,141,16,208,173,21,208,9,2,141,21,208,173,0,220
17160 data73,255,41,15,208,3,173,176,2,141,177,2,169,16,141,169
17170 data2,162,128,142,4,212,232,142,4,212,238,40,208,76,32,130
17180 data32,253,174,32,138,173,32,247,183,96,234,234,234,234,234,234
17190 data1,2,4,8,16,32,64,128,254,253,251,247,239,223,191,127
17200 data120,32,32,129,173,21,208,57,56,129,141,21,208,88,96,234
17210 data120,32,32,129,173,21,208,25,48,129,141,21,208,88,96,234
17220 data120,32,32,129,72,152,72,32,32,129,152,72,32,32,129,152
17230 data10,170,104,157,1,208,104,157,0,208,104,201,1,173,16,208
17240 data57,56,129,144,3,25,48,129,141,16,208,88,96,234,234,234
17250 data120,169,4,133,98,162,4,173,21,208,37,98,240,100,173,16
17260 data208,37,98,201,1,189,0,208,106,56,233,8,74,74,133,99
17270 data189,1,208,56,233,46,41,248,72,133,100,169,0,6,100,42
17280 data6,100,42,168,104,24,101,99,144,1,200,24,101,100,144,1
17290 data200,133,167,133,169,24,152,105,68,133,168,105,148,133,170,160
17300 data0,177,167,201,100,208,35,134,99,162,3,188,20,130,189,24
17310 data130,145,167,169,252,145,169,202,16,241,162,3,142,8,212,162
17320 data64,142,11,212,232,142,11,212,166,99,232,232,6,98,144,135
17330 data88,96,0,0,0,1,40,41,129,130,131,132,0,0,0,0
17340 data173,21,208,72,133,252,173,0,208,172,1,208,162,14,32,112
17350 data130,144,2,30,171,104,10,10,133,252,41,8,240,13,173,2
17360 data208,172,3,208,162,10,32,112,130,176,3,76,49,234,138,74
17370 data170,169,241,157,39,208,169,15,157,176,2,169,1,157,168,2
17380 data169,0,141,169,2,76,49,234,234,0,0,0,0,0,0,0
17390 data133,253,132,254,6,252,144,30,189,1,208,56,229,254,201,8
17400 data144,4,201,247,144,16,189,0,208,56,229,253,201,8,144,4
17410 data201,247,144,2,56,96,202,202,224,3,176,216,96
```

■

MAIL ORDER PROTECTION SCHEME

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, *Your Computer* will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided that:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of of *Your Computer* summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claims and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent.

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements. Classified advertisements are excluded.

CHARLIE CHAN VISITS THE WOK FACTORY

Brian Lewis with an oriental orgy of violence on the BBC.

IMAGINE THE situation, there you are with your hot steaming rice in lotus leaf ready to tuck into your favourite meal of the day when you realise that there are no woks to cook your repas in and what's more, number one son is no where in sight so it looks like you'll have to get those woks yourself.

Untold nasties lurking

The only way you can get a wok at such short notice is to go to the old wok factory once owned by Mr Woo. However, this is not as easy as it seems because there are untold nasties lurking in the shadows of each of the factory's rooms. In all there are 15 screens and 15 woks to collect, but if you find any screen too hard simply press the Return key and you will go onto the next screen. Of course, you will gain no points for your efforts if you do this.

There are five different nasties — listed in the instructions — all of which are animated and all of which you have to avoid because the slightest touch can kill, and you can also die from falling too far.

Each of the listings should be typed in and checked and then saved one after the other on the same tape, but make sure you have a copy of listings 2 and 3 before you run them as they contain machine code and a mistake could cause a bad program ruining all your hard work typing in the game. If the listings appear quite long remember that the game has to store data for 15 screens which, even after massive compressing, is still quite lengthy.

As with all such games the controls are a simple left, right and jump type which may take a small amount of time to get used to because the longer a directional key is pressed the farther the jump goes in the appointed direction. This technique must be mastered to clear certain sheets.

If BBC users wish to type in and play Charlie Chan Visits the Wok Factory they merely have to increase the values of the X and Y registers in line 320 of the second listing, their exact value will have to be found through experiment. I would like to apologise here and now for the sequence that occurs after all the lives are lost.

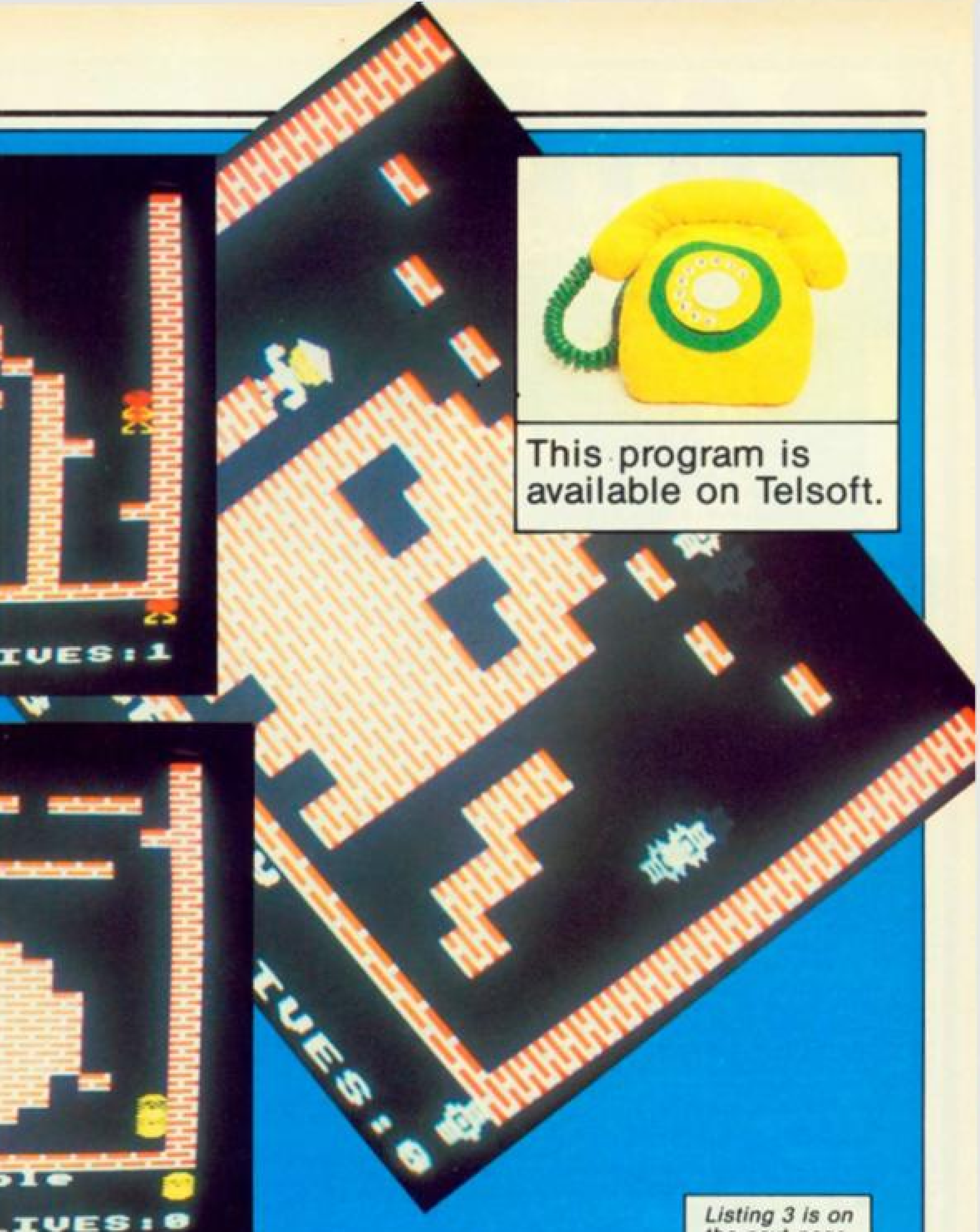
Listing 2.

```
10ENVELOPE11,1,2,1,2,1,1,0,126,0,0,-126,126,126
20DATA40,20,40,10,40,10,52,10,48,10,40,10,48,20,32,
10,20,40
30DATA88,10,88,20,88,20,88,10,88,10,100,10,96,10,88
,10,96,20,80,10,68,30
40DATA40,20,40,10,40,10,52,10,48,10,40,10,48,20,32,
10,20,40,88,10,88,20,88,20,88,10,88,10,100,10,96,10,88
,10,96,20,80,10,68,30
50DATA52,40,48,40,40,15,32,20,32,10,52,40,48,40,40,
15,32,40
60DATA1,0,11,255,40,0,15,0
70RESTORE20:FORT=0TO97:READD:T?&4000=D:NEXT
80RESTORE60:FORT=0TO7:READD:T?&4062=D:NEXT
90?&950=20:?&951=0
100FORT=0TO2STEP2:P%=&406A:[OPTT
110DEC&950:LDA&950:BNEnosound:.a LDA#21:LDX#5:JSR&FF
F4
120INC&951:INC&951:LDX&951:LDA&4000,X:STA&4066:LDA&4
001,X:STA&950:LDA#7:LDX#&62:LDY#&40:JSR&FFF1:LDA&951:C
MP#96:BEQend
130.nosound RTS
140.end LDA#254:STA&951:JMPa
150]
160NEXT
170CHAIN""
```

Listing 1.

```
1MODE4
2REM IMPORTANT:: CHECK BEFORE RUNNING !
*10VDU23,128,254,254,254,0,239,239,239,0,23,129,0,0,
0,0,255,126,60,24
20VDU23,130,60,94,239,255,255,255,126,60,23,131,36,
36,36,165,102,0,0,0
30VDU23,132,60,126,255,0,72,149,106,165,23,133,0,12
6,255,126,0,255,126,60
40VDU23,134,36,60,36,60,36,126,195,90,23,135,90,195
,126,36,60,36,60,36
50VDU23,136,255,129,145,185,147,133,181,181,23,137,
181,181,133,147,185,145,129,255
60VDU23,138,16,56,124,120,124,120,124,120,23,139,12
4,60,24,126,255,255,66,231
70VDU23,145,60,94,239,255,255,255,126,60,23,146,36,
66,129,129,231,0,0,0
80VDU23,147,0,0,0,60,126,255,72,149,23,148,106,165,
126,255,126,255,126,60
90VDU23,149,60,36,60,36,60,126,66,219,23,150,219,66
,126,60,36,60,36,60
100VDU23,151,255,129,169,145,171,133,181,181,23,152,
181,181,133,171,145,169,129,255
110VDU23,153,4,14,31,30,31,30,31,30,23,154,31,15,6,1
26,255,255,231,0
120ENVELOPE1,1,1,-5,2,10,1,10,126,0,0,-126,126,126
130ENVELOPE2,1,20,30,100,1,2,1,126,0,0,-126,126,126
140DATA0,0,0,0,17,0,0,0,17,51,119,255,255,240,176,20
8,0,136,204,238,255,224,160,96,0,0,0,0,0,0,0,0,0,0,0
,0,17,51,51,240,112,64,48,17,255,255,119,224,192,80,14
5,17,221,255,255,0,0,0,136,136,136,136,0,51,51,51,16,0
,0,0,0,51,51,3,3,3,35,34,102
150DATA136,136,8,8,8,136,204,0,0,0,0,0,0,0,0,0
160DATA0,0,0,0,0,0,0,0,0,17,51,119,255,112,80,96,136
,204,238,255,255,240,208,176,0,0,0,0,136,0,0,0,0,0,16,
51,51,51,51,17,112,48,32,16,17,119,255,255,240,224,32,
192,0,255,255,221,0,0,0,0,0,0,136,136,0,0,0,0,0,0,0,0,
51,51,3,3,3,35,102,0,153,153
170DATA25,24,8,136,136,204,136,136,136,0,0,0,0,0
180DATA&11,0,1,0,2,0,5,0,&11,0,2,0,9,0,1,0
190J%=&5200
200RESTORE140:FORT%=0TO207:READD:T%?J%=D:NEXT:sou=J%
+192:sOu2=sou+8:M%=sOu2+8:FORT=0TO2STEP2:P%=M%:[OPTT
210LDA#&90:STA&70:LDA#&73:STA&71:LDA#0:STA&72:STA&76
:STA&77:STA&79:STA&7C:STA&9C:LDA#2:STA&73:LDA#J% MOD25
6:STA&74:LDA#J% DIV256:STA&75:LDA#&80:STA&9D:LDA#&78:S
TA&9E
220JSRdis:.start LDA&7C:CMP#4:BMIj1:JMPnoleft:.j1
230JSRCHri:CPX#&FF:BEQnoright:LDA#&81:LDX#&BD:LDY#&F
F:JSR&FFF4:CPY#&FF:BNEnoright:JSRdis:CLC:LDA&70:ADC#8:
STA&70:LDA&71:ADC#0:STA&71:INC&72:JSRani:JSRdis:JSRSOU
2
240.noright JSRchLE:CPX#&FF:BEQnoleft:LDA#&81:LDX#&9
E:LDY#&FF:JSR&FFF4:CPY#&FF:BNEnoleft:JSRdis:SEC:LDA&70
:SBC#8:STA&70:LDA&71:SBC#0:STA&71:DEC&72:JSRani:JSRdis
:JSRSOU2
250.noleft JSRcheck:CPX#&FF:BEQnojump:LDA&77:CMP#1:B
EQnojump:LDA#&81:LDX#&FF:LDY#&FF:JSR&FFF4:CPY#&FF:BNEn
ojump:JSRjump
260.nojump LDA&77:CMP#0:BEQnS:JSRJUMP
270.nS LDA#&81:LDY#&FF:LDX#&B6:JSR&FFF4:CPY#&FF:BNEH
S:RTS:.HS JSRcheck:CPX#&FF:BNEe1:JSRHOLE
280.e1 LDA&72:CMP#34:BNEg1:JSRscore:JSRscore:JSRscor
e:JSRscore:RTS:.g1 LDA&7C:CMP#&FF:BNEh1:LDA#10:STA&79:
RTS:.h1 LDX#0:JSRenemy:CPX#&FF:BNEuU2:STX&79:RTS:.uU2
JSRdelay:JMPstart
290.dis LDY#0:.A LDA(&70),Y:EOR(&74),Y:STA(&70),Y:IN
Y:CPY#32:BNEA:CLC:LDA&70:ADC#&20:STA&4D:LDA&71:ADC#1:S
TA&4E:.B LDA(&4D),Y:EOR(&74),Y:STA(&4D),Y:INY:CPY#64:B
NEB:CLC:LDA&4D:ADC#&20:STA&4D:LDA&4E:ADC#1:STA&4E:.C L
DA(&4D),Y:EOR(&74),Y
300STA(&4D),Y:INY:CPY#96:BNEC:RTS
310.ani LDA&76:CMP#1:BEQsc:CLC:LDA&74:ADC#96:STA&74:
LDA&75:ADC#0:STA&75:LDA#1:STA&76:RTS:.sc SEC:LDA&74:SB
C#96:STA&74:LDA&75:SBC#0:STA&75:LDA#0:STA&76:RTS
320.delay LDX#100:.D LDY#150:.E DEY:BNEE:DEX:BNED:RT
S
```





This program is available on Telsoft.



Listing 3 is on the next page.

```
  330.check LDX#0:LDA&77:CMP#1:BEQF:CLC:LDA&70:ADC#&C0
:STA&4D:LDA&71:ADC#3:STA&4E:LDY#8:.E LDA(&4D),Y:AND#15
:BEQH:INX:.H INY:CPY#24:BNEE:CPX#0:BEQdrop:.F LDX#0:LD
A&7C:CMP#8:BMIi1:LDA#&FF:STA&7C:RTS:.i1 STX&7C:RTS
  340.drop INC&7C:DEC&73:JSRdis:JSRani:CLC:LDA&70:ADC#
&40:STA&70:LDA&71:ADC#1:STA&71:JSRdis:LDX#&FF:RTS
  350.jump LDA#1:STA&77:LDA#0:STA&78:JMPSOU
  360.JUMP LDA&73:CMP#23:BPLend:INC&78:LDA&78:CMP#5:BP
Ldown:INC&73
  370JSRdis:SEC:LDA&70:SBC#&40:STA&70:LDA&71:SBC#1:STA
&71:JMPdis
  380.down LDA&78:CMP#6:BEQend:RTS:.end LDA#0:STA&77:R
TS
  390.SOU LDA&953:CMP#&FF:BEQzZ2:LDA#7:LDX#sou MOD256:
LDY#sou DIV 256:JSR&FFF1:.zZ2 RTS
  400.CHri CLC:LDA&70:ADC#32:STA&4D:LDA&71:ADC#0:STA&4
E:LDY#0:.a1 LDA(&4D),Y:AND#15:BNEhit:INY:CPY#8:BNEa1:L
DX#0:RTS:.hit LDX#&FF:RTS
  410.chLE SEC:LDA&70:SBC#8:STA&4D:LDA&71:SBC#0:STA&4E
:LDY#0:.b1 LDA(&4D),Y:AND#15:BNEhit:INY:CPY#8:BNEb1:LD
X#0:RTS
  420.SOU2 LDA&953:CMP#&FF:BEQzZ2:LDA#7:LDX#sOu2 MOD25
6:LDY#sOu2 DIV 256:JMP&FFF1
  430.check LDA&70:STA&4D:LDA&71:STA&4E:LDY#0:.c1 LDA(
&70),Y:EOR(&74),Y:BNEsee2:.d1 INY:CPY#24:BNEc1:LDX#0:R
TS
  440.see2 AND#15:BNEd1:LDX#&FF:RTS
  450.HOLE LDY#21:.f1 LDA#31:JSR&FFEE:LDA#19:JSR&FFEE:
TYA:JSR&FFEE:LDA#32:JSR&FFEE:INY:CPY#25:BNEf1:JSRdis:L
DA#31:JSR&FFEE:LDA&78:JSR&FFEE:LDA&7D:JSR&FFEE:LDA#32:
JSR&FFEE:JSRdis:JMPscore
  460.enemy LDY#0:.k1 LDA&D60,Y:STA&A60,Y:INY:CPY#7:BN
Ek1:JSRENE:JSRDIS2:LDY#0:.l1 LDA&A60,Y:STA&D60,Y:INY:C
PY#7:BNEl1
  470LDY#0:.m1 LDA&D70,Y:STA&A60,Y:INY:CPY#7:BNEm1:JSR
ENE:JSRDIS2:LDY#0:.n1 LDA&A60,Y:STA&D70,Y:INY:CPY#7:BN
En1:RTS
  480.ENE JSRread
  490LDY#0:TYA:.s1 STA(&4D),Y:INY:CPY#16:BNEs1:CLC:LDA
&4D:ADC#&40:STA&4D:LDA&4E:ADC#1:STA&4E:.t1 LDY#0:TYA:.
u1 STA(&4D),Y:INY:CPY#16:BNEu1
  500LDA&A66:CMP#1:BEQlef:CMP#2:BEQrig:CMP#4:BEQup:CMP
#8:BEQdow:RTS
  510.lef DEC&A60:LDA&A60:CMP&A64:BEQrev:RTS:.rig INC&
A60:LDA&A60:CMP&A62:BEQrev:RTS:.up DEC&A61:LDA&A61:CMP
&A65:BEQrev:RTS:.dow INC&A61:LDA&A61:CMP&A63:BEQrev:RT
S
  520.rev LDA&A66:CMP#1:BEQLEF:CMP#2:BEQRIG:CMP#4:BEQU
P:CMP#8:BEQDOW:.LEF LDA#2:JMPDO:.RIG LDA#1:JMPDO:.UP L
DA#8:JMPDO:.DOW LDA#4:.DO STA&A66:RTS
  530.read LDA#0:STA&4D:LDA#&58:STA&4E:LDY&A60:.o1 CPY
#0:BEQp1:CLC:LDA&4D:ADC#16:STA&4D:LDA&4E:ADC#0:STA&4E:
DEY:JMPo1:.p1 LDY&A61:.q1 CPY#0:BEQr1:CLC:LDA&4D:ADC#&
40:STA&4D:LDA&4E:ADC#1:STA&4E:DEY:JMPq1:.r1 RTS
  540.HIT LDX#&FF:RTS
  550.DIS2 JSRread:LDY#0:.aa1 LDA(&4D),Y:BNEHIT:INY:CP
Y#16:BNEaa1:CLC:LDA&4D:ADC#&40:STA&4D:LDA&4E:ADC#1:STA
&4E:LDY#0:.bb1 LDA(&4D),Y:BNEHIT:INY:CPY#16:BNEbb1
  560SEC:LDA&4D:SBC#&40:STA&4D:LDA&4E:SBC#1:STA&4E:LDY
#0:.cc1 LDA(&9D),Y:STA(&4D),Y:INY:CPY#16:BNEcc1:CLC:LD
A&4D:ADC#&40:STA&4D::LDA&4E:ADC#1:STA&4E:CLC:LDA&9D:AD
C#&40:STA&9D:LDA&9E:ADC#1:STA&9E::LDY#0:.dd1 LDA(&9D),
Y:STA(&4D),Y:INY:CPY#16
  570BNEdd1:SEC:LDA&9D:SBC#&40:STA&9D:LDA&9E:SBC#1:STA
&9E:INC&9C:LDA&9C:CMP#10:BNEx1:LDA#0:STA&9C:LDA&9D:CMP
#&80:BEQy1:LDA#&80:STA&9D:LDA#&79:STA&9E:RTS:.y1 LDA#&
80:STA&9D:LDA#&78:STA&9E:.x1 RTS
  571.score INC&B1:LDA&B1:CMP#10:BNEshow:LDA#0:STA&B1:
INC&B2:LDA&B2:CMP#10:BNEshow:LDA#0:STA&B2:INC&B3:LDA&B
3:CMP#10:BNEshow:LDA#0:STA&B3:INC&B4:LDA&B4:CMP#10:BNE
show:LDA#0:STA&B4:INC&B5
  572.show LDA#31:JSR&FFEE:LDA#0:JSR&FFEE:LDA#28:JSR&F
FEE:LDY#3:.zz2 CLC:LDA&B0,Y:ADC#48:JSR&FFEE:DEY:CPY#&F
F:BNEzz2:RTS
  580]:NEXT
  581PRINTTAB(0,15);"Well you'll just have to do witho
ut the             title page won't you"
  590PRINT''''''':CHAIN""
```

(continued from previous page)

Listing 3.

```
1VDU23,142,84,84,131,128,128,135,136,240,23,143,0,0,128,126,1,1,129,126,23,144,84,84,84,84,84,84,84,84
2ENVELOPE7,1,1,-1,-1,1,2,1,126,0,0,-126,126,126
10DATA192,0,240,0,48,0,0,0,0,0,0,2,192,0,48,0,12,0,19,143,192,0,0,0,0,76,0,3,64,0,192,1,48,124,0,0,0,0,4,200,0,48,0,76,0,3,0,0,209,1,52,64,13,16
20DATA0,0,0,0,0,0,0,0,0,63,255,192,0,0,0,0,0,1,0,0,63,255,192,0,0,0,0,128,0,0,0,3,255,252,0,0,0,0,0,0,16,0,3,255,252,0,0,0,0,8,0,0,0,0
30DATA0,0,0,0,0,0,0,255,255,0,0,64,0,0,0,0,0,0,122,35,96,0,0,0,0,0,0,218,0,0,64,0,11,176,0,0,0,0,0,0,16,0,0,46,250,16,0,8,0,0,0,0,0,0
40DATA0,0,0,0,0,0,3,0,0,28,62,0,0,0,0,0,4,0,0,0,0,0,0,127,12,64,64,16,16,12,6,1,1,0,96,64,48,20,4,4,1,65,32,192,64,16,17,4,132,1,1,1,66,64
50DATA0,0,0,0,0,0,0,0,29,238,192,0,0,0,4,0,0,0,0,55,123,128,0,2,0,0,0,0,0,0,13,222,224,0,0,0,0,0,0,16,0,0,238,236,18,162,4,228,193,40,160,202,236
60DATA0,0,0,0,0,0,0,0,0,0,0,112,0,34,0,16,64,8,136,2,114,1,62,64,159,200,47,250,25,252,130,127,32,146,76,39,242,25,252,130,107,32,159,201,99,226,8,136,130,28,33,130,8
70DATA0,0,0,0,10,68,184,0,0,0,0,64,0,15,204,240,0,0,0,0,0,120,0,63,0,25,224,14,124,1,255,0,31,224,1,248,0,62,0,31,128,31,224,31,244,15,252,1,254,2,63,0,7,128
80DATA0,0,0,0,0,0,0,0,64,1,0,0,1,73,64,7,0,3,224,1,248,0,127,0,22,192,4,144,1,36,1,127,64,95,208,23,244,13,253,130,127,32,159,200,39,243,17,84,68,85,0,0,0
90DATA0,0,0,0,0,0,0,128,10,32,7,248,0,170,0,2,128,0,128,7,255,1,132,64,80,144,18,20,4,67,129,8,64,97,16,20,39,4,133,1,16,192,66,16,31,252,193,4,0,65,0,56,224

100DATA0,0,0,4,0,0,0,0,6,128,0,45,128,0,0,0,10,0,0,0,0,13,202,104,0,0,0,0,0,0,16,0,0,255,252,31,254,3,255,0,127,128,15,195,195,240,0,0,2,0,0,0,0
110DATA0,16,0,4,0,1,0,192,64,0,16,0,4,0,1,0,224,64,6,16,0,4,0,1,2,3,64,0,16,0,4,1,153,0,0,0,192,0,0,0,0,0,0,0,0,57,254,0,127,128,31,224,7,248
120DATA0,0,0,0,0,0,0,0,0,63,192,0,3,128,0,128,0,32,32,8,0,2,112,255,128,0,32,64,8,0,2,0,1,134,0,32,0,9,143,242,0,0,128,0,32,0,14,8,2,0,0,128
130DATA0,0,0,0,0,0,0,0,63,255,192,0,0,0,0,0,0,224,0,64,0,16,0,0,0,0,3,254,0,0,0,0,0,64,0,0,0,0,0,4,0,32,128,16,16,8,4,2,0,129,0,63,192
140DATA127,255,159,255,231,255,248,255,252,31,254,3,255,0,0,0,0,0,0,0,0,0,0,0,0,0,0,63,255,144,0,0,0,1,0,0,0,0,0,0,0,255,255,0,0,8,0,0,0,0,0,0
150DATA0,0,29,221,133,84,65,84,152,85,20,21,221,128,0,0,0,1,0,0,192,0,240,0,124,0,63,0,31,192,15,240,7,252,3,255,3,255,193,255,240,255,156,127,195,0,0,16,0,0,0,0,0,0
160DATAEntrance,The Steps',Mess,The Safe,His Name,Mr Woo,Gobble Gobble,Ghosty,Sales Rooms,THE GREAT WOCK,Divide,Blob,Empty Wock,The Press,ROUISE
170DATA&11,0,1,0,10,0,10,0
180DATA&11,0,2,0,2,0,1,0
190MODE4:DIMA$(15):RESTORE160:FORT%=1TO15:READA$(T%):NEXT:CLS:PRINT'''SPC(2);"WOULD YOU LIKE INSTRUCTIONS (Y/N)?"
191A$=GET$:IF A$<>"Y" AND A$<>"N" THEN 191 ELSE IF A$="Y" THEN 620
200DEFPROCWALL:COLOUR131:COLOUR1:FORT%=1TO24:PRINTTAB(0,T%);CHR$128;TAB(19,T%);CHR$128;:NEXT:PRINTTAB(0,T%);STRING$(20,CHR$128);:ENDPROC
210FORT=0TO5:T?&80=0:NEXT:A=0:lives%=3:?&79=A:MODE5:VDU23,1,0;0;0;0;
230*FX15,1
240PROCWALL:COLOUR128:COLOUR3:PRINTTAB(0,30)"PRESS SPACE TO START";
250A$=GET$:IF A$<>" " THEN 250
251?&953=0:PRINTTAB(2,26)"KRAFTWERK (Y/N)?":A$=GET$:IF A$<>"N" AND A$<>"Y" THEN 251 ELSE IF A$="N" THEN 254
252?&953=&FF:?&950=20:?&951=0:?&220=&6A:?&221=&40:SOUND1,-15,40,15
253*FX14,4
254PRINTTAB(2,26);SPC(16)
260PRINTTAB(0,30);SPC(20);:COLOUR1:COLOUR131:PROCREAS
270PROCEN:COLOURE:PRINTTAB(0,26);CHR$(AS)TAB(19,26);CHR$(AS+15):COLOURF:PRINTTAB(0,27);CHR$(BS)TAB(19,27);CHR$(BS+15);
280B=(A/10):COLOUR128:COLOUR3:PRINTTAB(0,29);"SHEET:";B;TAB((20-(LENA$(B)))/2,26);A$(B);TAB(13,29);"LIVES:";lives%
300B=430+A:RESTOREB:FORT=0TO6:READD:T?&D60=D:NEXT:FORT=0TO6:READD:T?&D70=D:NEXT
310COLOUR128:CALLM%:PRINTTAB(0,26);SPC(20)TAB(0,27);SPC(20)
320IF ?&79>8 THEN PROCDEAD
330IF lives%=-1 THEN 370
340COLOUR131:COLOUR1:FORT%=21TO24:PRINTTAB(19,T%);CHR$128;:NEXT:VDU28,1,24,18,1,17,128:FORT%=1TO25:PRINTTAB(0,0);CHR$11;:NEXT:VDU26
341GOTO260
350DEFPROCDEAD:FORT=0TO200STEP10:FORG=0TO50:NEXT:VDU19,0,1;0;:FORG=0TO50:NEXT:VDU19,0,0;0;:SOUND&11,1,255-T,3:NEXT
360lives%=lives%-1:ENDPROC
370*FX15,1
371*FX13,4
372*FX21,5
379PROCRIPOFF
380GOTO210
390DEFPROCREAS:IF ?&79<6 A=A+10:IF A=160 A=10
400RESTOREA:X%=1:Y%=1:FORT%=0TO53:A%=128:READD:FORH%=0TO7:IF (D AND A%)=A% THEN PRINTTAB(X%,Y%);CHR$128;
410X%=X%+1:IF X%=19 X%=1:Y%=Y%+1
420A%=(A%/2):NEXT,:B=(A/10):COLOUR2:COLOUR128:RESTORE430:FORT=1TOB:READX,Y:NEXT:PRINTTAB(X,Y);CHR$129:?&7B=X:?&7D=Y:ENDPROC
430DATA8,3,4,1,4,1,10,22,6,1,9,2,9,4,9,3,15,11,1,7,3,1,2,2,3,1,1,10,18,4
440DATA1,10,17,10,2,10,2,10,16,17,16,2,16,2
450DATA5,6,17,6,4,6,2,1,16,14,16,2,16,2
460DATA6,5,6,21,6,6,8,10,10,10,21,10,6,8
470DATA11,15,11,22,11,15,8,18,12,18,22,18,13,8
480DATA6,8,16,8,7,8,2,10,17,16,17,3,17,2
490DATA1,3,17,3,2,3,2,18,5,18,17,18,6,8
500DATA1,5,16,5,2,5,2,18,9,18,22,18,10,8
510DATA4,4,14,4,4,4,2,17,10,17,22,17,11,8
520DATA2,10,2,22,2,11,8,18,10,18,18,18,11,8
530DATA3,8,13,8,4,8,2,1,13,15,13,2,13,2
540DATA13,15,13,19,13,13,8,18,12,18,22,18,13,8
550DATA1,14,10,14,1,14,2,2,9,10,9,2,9,2
560DATA1,10,14,10,2,10,2,9,14,9,22,9,15,8
570DATA1,11,14,11,2,11,2,3,15,14,15,4,15,2
580DATA7,7,7,15,7,8,8,4,23,16,23,5,23,2
590DEFPROCEN:B=(A/10):IF (B MOD 5)=1 E=1:F=2:AS=130:BS=131 ELSE IF (B MOD 5)=2 E=2:F=2:AS=132:BS=133 ELSE IF (B MOD 5)=3 E=3:F=3:AS=134:BS=135 ELSE IF (B MOD 5)=4 E=3:F=3:AS=136:BS=137
600IF (B MOD 5)=0 E=1:F=1:AS=138:BS=139
610ENDPROC
620MODE4:VDU23,1,0;0;0;0;:A$="CHARLIE CHAN":B$="VISITS":C$="THE WOCK FACTORY":DIMB$(5):RESTORE790:FORT=1TO5:B$(T)="..........":READG$:B$(T)=B$(T)+G$:NEXT
630FORT%=1TOLENA$:G=ASC(MID$(A$,T%,1)):PROCDBL(G):PRINTTAB(T%+13,10);CHR$140TAB(T%+13,11);CHR$141:NEXT
640FORT%=1TOLENB$:G=ASC(MID$(B$,T%,1)):PROCDBL(G):PRINTTAB(T%+16,13);CHR$140TAB(T%+16,14);CHR$141:NEXT
650FORT%=1TOLENC$:G=ASC(MID$(C$,T%,1)):PROCDBL(G):PRINTTAB(T%+11,16);CHR$140TAB(T%+11,17);CHR$141:NEXT
660VDU19,0,1;0;:FORG=0TO500:NEXT:VDU19,1,0;0;:FORT%=0TO8:PRINTTAB(19,31):SOUND&11,2,T%*25,4:FORG=0TO30:NEXT,:PRINTTAB(0,10);STGING$(40,"_")
670PRINTTAB(12,13);"Do Battle With:-"
680PRINTTAB(1,15);CHR$130TAB(1,16);CHR$131TAB(1,18);CHR$132TAB(1,19)CHR$133TAB(1,21);CHR$134TAB(1,22);CHR$135TAB(1,24);CHR$136TAB(1,25);CHR$137TAB(1,27);CHR$138TAB(1,28);CHR$139
690GG%=1:FORT%=16TO28STEP3:FORG%=1TOLENB$(GG%):PRINTTAB(G%+3,T%);MID$(B$(GG%),G%,1);:PROCsound:FORG=0TO60:NEXT,:GG%=GG%+1:FORG=0TO100:NEXT,
700FORG=0TO5000:NEXT:VDU17,129,28,0,31,39,11,12,26,17,0
710PRINTTAB(0,12);"You (Charlie Chan) must go around the   deserted wock factorying to collect somewocks to cook your tea with.However the prementioned nasties hinder you progressas much as they can."
720PRINT''"On each of the 15 screens there will be a wock to collect and the exit will not be opened until you have collected it.  You have three lives and loose one if   you drop too far or get hit."
730PRINT''"THE KEYS ARE:-"'"Z  -  LEFT
     X - RIGHT"
740PRINT"                    shift - JUMP"
750FORG=0TO15000:NEXT:VDU19,0,0;0;19,1,6;0;:PRINTTAB(4,30);"BE VELY PLEASED IF HONORABLE SIR";TAB(12,31);"PLESS SPACE BAR!";
760A$=GET$:IF A$<>" " THEN 760
770CLS:GOTO210
780DEFPROCDBL(G):?&70=G:A%=10:X%=&70:Y%=0:CALL&FFF1:VDU23,140,?&71,?&71,?&72,?&72,?&73,?&73,?&74,?&74,23,141,?&75,?&75,?&76,?&76,?&77,?&77,?&78,?&78:ENDPROC
790DATACONAN THE BALL BEARING,Hammy Burger,WALLY WATCH,Henry Head Cleaner,KEVIN QUICKSHOT
800DEFPROCRIPOFF:FORT=1TO3:VDU19,T,0;0;:NEXT:CLS:COLOUR131:COLOUR1:FORT%=20TO30:PRINTTAB(8,T%)CHR$128;CHR$128;CHR$128;CHR$128:NEXT
810FORT%=0TO2:FORG%=0TO31:G%?(&6DD0+(T%*320))=G%?(J%+(32*T%)):NEXT,
820COLOUR128:COLOUR3:A$=" "+CHR$144+" "+CHR$8+CHR$8+CHR$8+CHR$10+" "+CHR$142+CHR$143+" "
821VDU19,1,1;0;19,2,3;0;19,3,7;0;
830FORT%=0TO18:PRINTTAB(8,T%);A$;
840SOUND&11,7,255-(T%*14),2:FORG=0TO60:NEXT,
870FORG=0TO1000:NEXT:CLS:ENDPROC
999END
1020DEFPROCSOUND:SOUND&11,1,T*25,1:FORG=0TO50:NEXT:ENDPROC
1080DEFPROCsound:SOUND&11,1,255,1:ENDPROC
```

■



ATARI ST

520ST

POWER WITHOUT THE PRICE

THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the user amazingly high performance at an incredibly low price. Launched as a work-station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3½ inch disk drive, all for the package price of only £651.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2595 (+VAT = £2985) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in this country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system 'GEM' from Digital Research. GEM stands for Graphics Environment Manager and allows a user friendly colour or B/W graphics interface which closely resembles that of the Macintosh. This similarity extends to the use of moveable resizeable windows, icons to represent objects such as disks and disk drives, and the use of pull down menus and a mouse. The advantage of all this is that the computer becomes extremely easy to use. GEM has now been implemented for the Acorn, ACT, Atari, IBM, ICL, and Olivetti. Software written for GEM on one computer should also run under GEM on another computer. This will enable the market to quickly produce a large library of standard interchangeable software.

FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below: 1)"TOS -Tramiel Operating System based on CPM 68K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the Basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3½ inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

Silica Shop Price: £651.30 + £97.70 VAT = £749.00 This price includes:

- ★ 512K RAM
- ★ MOUSE
- ★ GEM
- ★ B/W MONITOR
- ★ 500K 3.5" DISK DRIVE
- ★ KEYBOARD (95 KEYS)

£749

ATARI 520ST SPECIFICATION

MEMORY
512K RAM (524,288 bytes)
16K ROM expandable to 320K
Port for addnl 128K plug-in ROM cartridges
200K TOS operating system

GRAPHICS
Individually addressable 32K bit-mapped screen with 3 screen graphics modes:
320x200 pixels in 16 colours (low resolution)
640x200 pixels in 4 colours (med resolution)
640x400 pixels in monochrome (high res)
16 shades of grey in low res mode
512 colours available in low/medium res
8 levels of each in red, green and blue

ARCHITECTURE
4 custom designed chips:
GLUE Chip - MMU Memory Mngmnt Unit
DMA Controller - Graphics Processing Unit
16/32 bit Motorola 68000 processor at 8MHz
eight 32 bit data registers
eight 32 bit address registers
16 bit data bus/24 bit address bus
7 levels of interrupts/56 instructions
14 addressing modes/5 data types

DATA STORAGE
High speed hard disk interface
Direct memory access 1.33 Mbytes per second
CD (Compact Disc) interface
Built in cartridge access
Dedicated floppy disk controller

DISK DRIVE
500K (unformatted) s/sided 3½" floppy d/drive
349K (formatted) storage capacity

SOUND AND MUSIC
Sound Generator
Frequency control from 30Hz to above audible
3 voices (channels) in wave shaping sound in addition to a noise generator
Separate frequency and volume controls
Dynamic envelope controls
ADSR (Attack, Decay, Sustain, Release)
Noise generator
MIDI interface for external music synthesisers

KEYBOARD
Separate keyboard microprocessor
Standard QWERTY typewriter styling
Ergonomic angle and height
95 keys including 10 function keys
Numeric keypad — 18 keys including ENTER
One touch cursor control keypad

MONITOR
12" screen - high res monochrome monitor
640x400 monochrome resolution

VIDEO PORTS
Display - Low Resolution - 40 columns
Med/High Res - 40/80 plus cols
Medium res RGB (Red/Green/Blue) output
High resolution monochrome (Black & White)

COMMUNICATIONS
Bidirectional centronics parallel interface for printers, or modems capable of input/output
RS232C serial modem/printer interface
VT52 Terminal Emulation Software
Maximum Baud Rate up to 19,200
High speed hard disk interface
Floppy disk controller (Western Digital)
2 joystick ports (one for 2 button mouse)
MIDI interface for external music synthesisers

GEM WIMP ENVIRONMENT
WIMP - Window Icon Mouse Pop-down menus
Two button mouse controller
Icons/Pull down menus/Windows
GEM VDI - Virtual Device Interface
GEM AES - Application Environment Services
GEM BBT - Bit Block Transfer
Real time clock & calendar

SOFTWARE
GEM environment
with user friendly Macintosh style operation
'TOS' - Tramiel Operating System
Atari's own system based on CP/M 68K with hierarchical directory & file structure plus a host of MS DOS & UNIX command structures
'BOS' - Business Operating System
to run any standard BOS business programs
GEM desktop
with GEM PAINT graphics mgmt system
and GEM WRITE word processor
Personal BASIC and DR Logo
originally written by Digital Research (DR)
Very much like those on other machines except for the extensive use of pull down menus, mouse control and windows

VARIOUS
Dimensions: 470mmx240mmx60mm
Replaceable external power supplies
Expansion: 3½" floppy disk drives 500K/1,000K (two drives can be connected)
3½" 15Mb hard disk
CD (compact laser disc)
Dot matrix & d/wheel prints (black)
Thermal dot matrix (colour)
RGB & monochrome monitors

LANGUAGES
BASIC & LOGO supplied
Many others will soon be available, including Assembler, BCPL, C, Cobol, Compiled Basic, Lisp, Modula-2 and Pascal

Note: Some of the above specifications are pre-release and may therefore be subject to change

MACINTOSH v F1e v 520ST

"Imagine a Fat Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price."
June 1985 - Jack Schofield - **PRACTICAL COMPUTING**

FEATURES OF BASIC SYSTEM	APPLE MACINTOSH	APRICOT F1e	ATARI 520ST
Price includes B/W Monitor	YES	NO - extra £200	YES
Keyboard size mm (LxDxH)	330x147x50	450x167x28	470x240x60
Keyboard size ins (LxDxH)	13x5¾x2	17½x6½x1	18½x9½x2½
3½" D/Drive (Unformatted)	500K	500K	500K
3½" D/Drive (Formatted)	399K	315K	349K
WIMP (Window, Icon, Mouse ...)	Apple	ACT - Activity	GEM
Real-time Clock	YES	YES	YES
Polyphonic Sound Generator	YES	NO	YES
RS232 Serial Port	YES	YES	YES
Centronics Parallel Printer Port	NO	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES
Hard Disk DMA Interface	NO	YES	YES
Full stroke keyboard	YES	YES	YES
Number of keys on keyboard	59	92	95
Numeric Keypad	NO	YES (16 Keys)	YES (18 keys)
Cursor Control Keypad	NO	YES	YES
Function keys	NO	10	10
16-bit processor	68000	Intel 8086	68000
Processor running speed	8MHz	4.77MHz	8MHz
RAM size	512K	256K	512K
Number of graphics modes	1	4	3
Number of colours	Monochrome	16	512
Max Screen Resolution (pixels)	512 x 342	640 x 256	640 x 400
Mouse included	Single Button	NO - extra £95	Two Button
Replaceable External Power Pack	NO	NO	YES
Cartridge Socket	NO	NO	YES
Joystick Ports	NO	NO	YES (two)
MIDI Synthesiser Interface	NO	NO	YES
Monitor Size	9"	9" - extra £200	12"
RGB Video Output	NO	YES	YES

System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive

Price of basic system (exc VAT)	£2595+VAT	£595+VAT	£652+VAT
+ Mouse	Included	£95+VAT	Included
+ Monochrome Monitor	Included	£200+VAT	Included
+ Expansion to 512K RAM	Included	£295+VAT	Included
Price of complete system (exc VAT)	£2595+VAT	£1185+VAT	£652+VAT
PRICE rounded down including VAT	**£2,984**	**£1,362**	**£749**

PRESS COMMENT

"Atari's new corporate image as an aggressive low cost computer maker is likely to mirror that of Commodore where Mr. Tramiel established the maxim that 'Business is war'."
August 21st 1984 **FINANCIAL TIMES**

"This is the only personal computer I know of that comes with a Midi interface as standard."
Peter Bright March 1985 **PERSONAL COMPUTER WORLD**

"The (GEM) version running on the Atari 68000 machines will have the additional advantage of leaving the PC version standing." April 6th 1985 **PERSONAL COMPUTER NEWS**

"It would seem that GEM offers the ideal operating system."
March 7th 1985 **POPULAR COMPUTING WEEKLY**

"I found it (GEM) extremely easy to use and was very impressed with the way in which it disguises the unfriendly hardware and operating systems lurking under the surface."
Peter Bright Feb 1985 **PERSONAL COMPUTER WORLD**

"The electronics in the machine are a work of art... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip... when the machine appears in the shops, I'll be at the front end of the queue to buy one."
Peter Bright June 1985 **PERSONAL COMPUTER WORLD**

"This machine is significantly more powerful than an IBM PC ... if it's possible to design a sure-fire winning machine, this is it."
May 11th 1985 **PERSONAL COMPUTER NEWS**

"... the use of GEM makes the new range of Atari computers so similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jackintoshes'."
May 2nd 1985 **COMPUTING**

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying — easy-to-use computing power without the price." March 1985 **ANALOG COMPUTING**

"It (the ST) uses the most modern technology that is affordable, in a package that gives a professional impression."
May 23rd 1985 **POPULAR COMPUTING WEEKLY**

"The Atari ST is one of the most elegant designs I have seen... Atari has used an original and elegant method of memory management which should make the ST faster than any other PC on the market - in any price bracket ... The 64K dollar question is would I go out and spend money for one? To which the only answer is 'Try and stop me!'"
John Lambert July 1985 **ELECTRONICS & COMPUTING**

"The 520ST is technically excellent ... The 520ST hardware is the new standard by which others will be judged."
July 1985 **YOUR COMPUTER**

ATARI SILICA SHOP ATARI

WE ARE THE UK's No1 ATARI SPECIALISTS

At Silica we have been successfully dedicated to Atari ever since their products first appeared on the UK market. We can attribute our success largely to the Atari specialisation which we practice and to the user back-up we provide. Rest assured that when you buy a piece of Atari hardware at Silica you will be fully supported. Our mailings giving news of software releases and developments will keep you up to date with the Atari market and our technical support team and sales staff are at the end of the telephone line to deal with your problems and supply your every need. With our specialist bias, we aim to keep stocks of all the available Atari hardware, software, peripherals and accessories. We also stock a wide range of Atari dedicated books and through us, the owners on our list can subscribe to several American Atari dedicated magazines. We can provide a full service to all Atari owners and are now firmly established as the UK's NUMBER ONE Atari specialists. Here are just some of the things we can offer to our customers.

- FREE POST & PACKING ON MAIL ORDERS
- FREE NEXT DAY SECURICOR DELIVERY
- INFORMATION MAILING SERVICE
- TECHNICAL SUPPORT TEAM
- HIGHLY COMPETITIVE PRICES
- AFTER SALES SUPPORT SERVICE
- REPAIR SERVICE ON ATARI PRODUCTS

If you would like to be registered on our mailing list as an Atari computer owner, or as a person interested in buying an Atari machine, let us know. We will be pleased to keep you up to date with new Atari developments free of charge. So, return the coupon today and begin experiencing a specialist Atari service that is second to none.

SILICA HOTLINE 01-309 1111

SILICA SHOP LTD, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

SEND FOR FREE ATARI ST LITERATURE

To: Silica Shop Ltd, Dept YC 0885, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

PLEASE SEND ME FREE LITERATURE
ON THE NEW ATARI 520ST COMPUTER

Mr/Mrs/Ms: Initials: Surname:

Address:

Postcode:

Do you already own a computer
If so, which one do you own?

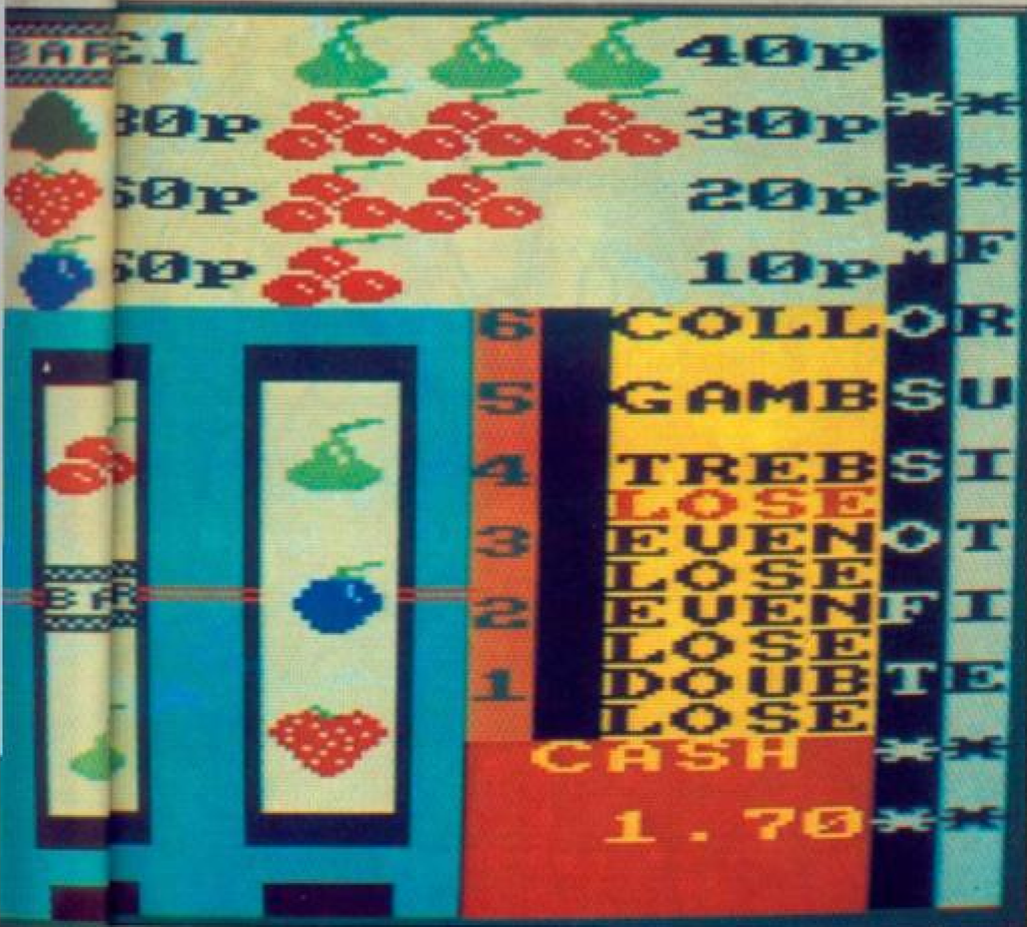


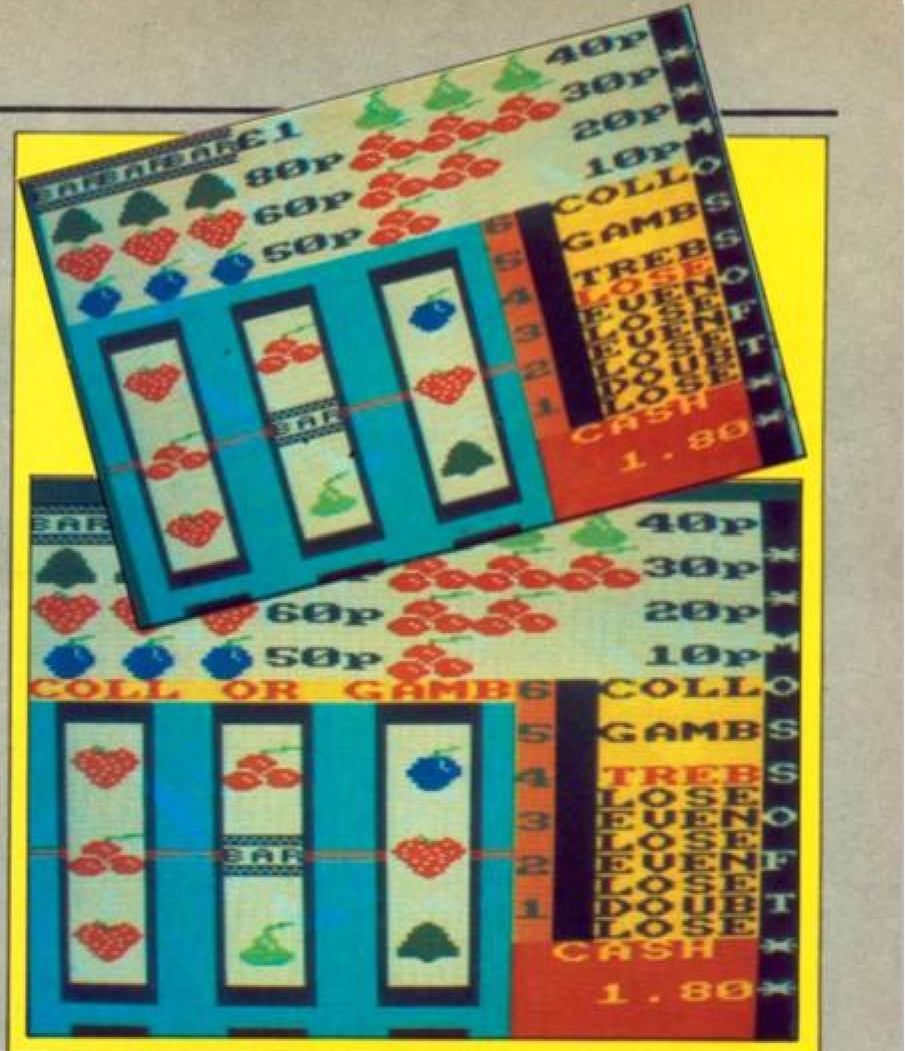


Listing 1.

```
10 MEMORY 29223
20 CLS:PRINT"PLEASE WAIT.   LOADING BYTES!"
30 LOAD"!"
40 LOAD"!"
50 RANDOMIZE TIME
60 ON ERROR GOTO 1600
70 ENV 1,1,15,1,14,-1,5,5,0,1
80 DIM G$(8):G$(1)="TREB":G$(2)="LOSE":G$(3)="EVEN":G$(4)=G$(2):G$(5)=G$(3):G$(6
)=G$(2):G$(7)="DOUB":G$(8)=G$(2)
90 r1$="SLPECAPLSC"
100 r2$="CPSLAECSPA"
110 r3$="SLPELSPCAE"
120 T$=CHR$(209)+CHR$(143)+CHR$(143)+CHR$(211)+CHR$(209)+CHR$(143)+CHR$(143)+CHR
$(211)+CHR$(209)+CHR$(143)+CHR$(143)+CHR$(211)
130 R1=1:R2=1:R3=1:FLAG=0:V%=7:W%=0
140 GOSUB 990
150 '"** MAIN LOOP **"
160 POF=0:F1=1:F2=1:F3=1
170 IF SC<=0 THEN GOTO 1510
180 FOR V=1 TO 3:PEN#V,3:PAPER#V,15:CLS#V:NEXT
190 IF HH=1 THEN GOSUB 790:GOTO 220
200 WHILE INKEY$<>"":WEND
210 WHILE INKEY(47)=-1:WEND
220 SC=SC-10:LOCATE#6,1,3:PRINT#6,USING"###.##";SC/100
230 IF F1=1 THEN a=(INT(RND*10)+5) ELSE A=0
240 IF F2=1 THEN b=(INT(RND*10)+10) ELSE B=0
250 IF F3=1 THEN c=(INT(RND*10)+20) ELSE C=0
260 GOSUB 900
270 HH=0
280 IF RND>0.7 AND POF=0 THEN GOSUB 620
290 IF RND<0.3 THEN HH=1:SOUND 1,30,0,0,1
300 GOTO 160
310 '"*** PAYOUT ***"
320 LOCATE 1,1
330 PO$=MID$(R1$,R1+1,1)+MID$(R2$,R2+1,1)+MID$(R3$,R3+1,1)
340 IF PO$="EEE" THEN S=80:GOTO 430
350 IF PO$="CCC" THEN S=30:GOTO 430
360 IF PO$="AAA" THEN S=100:GOTO 430
370 IF PO$="SSS" THEN S=60:GOTO 430
380 IF PO$="LLL" THEN S=50:GOTO 430
390 IF PO$="PPP" THEN S=40:GOTO 430
400 IF LEFT$(PO$,2)="CC" THEN S=20:GOTO 430
410 IF LEFT$(PO$,1)="C" THEN S=10:GOTO 430
420 RETURN
430 LOCATE#4,1,1:PEN#4,7:PRINT#4,"6 5 4 3 2 1 ";:CLS#5
440 LOCATE 1,9:PEN 3:PAPER 1:PRINT"COLL OR GAMB";
450 WHILE INKEY$<>"":WEND
460 IF INKEY(52)<>-1 THEN LOCATE 1,9:PAPER 2:PRINT"                ";:GOTO 490
470 IF INKEY(62)<>-1 THEN LOCATE 1,9:PAPER 2:PRINT"                ";:GOTO 590
480 GOTO 450
490 WHILE INKEY(18)<>-1:WEND
500 WHILE INKEY(18)=-1
510 V%=(V%+1) MOD(8):W%=(W%+1) MOD(8)
520 LOCATE#7,1,V%+1:PEN#7,15:PRINT#7,G$(V%+1);
530 LOCATE#7,1,W%+1:PEN#7,3:PRINT#7,G$(W%+1);
540 SOUND 1,234-(V%*10),2
550 WEND
560 IF W%+1=2 OR W%+1=4 OR W%+1=6 OR W%+1=8 THEN S=0
570 IF W%+1=7 THEN S=S*2
580 IF W%+1=1 THEN S=S*3
590 SC=SC+S
600 POF=1:LOCATE#6,1,3:PRINT#6,USING"###.##";SC/100;:RETURN
610 '"*** NUDGE ***"
620 POF=0:NU=INT(RND*6)+1
630 PEN #4,4:FOR V=1 TO NU:LOCATE#4,1,13-(V*2):PRINT#4,USING"#";V;:NEXT:PEN#4,7

640 PRINT#5," NUDGE  NOW";
650 WHILE NU>0 AND POF=0
660 WHILE INKEY$<>"":WEND
670 IF INKEY(64)<>-1 THEN A=1:B=0:C=0:GOTO 710
680 IF INKEY(65)<>-1 THEN A=0:B=1:C=0:GOTO 710
690 IF INKEY(57)<>-1 THEN A=0:B=0:C=1:GOTO 710
700 GOTO 660
710 SOUND 1,30,5:GOSUB 900
720 IF NU>0 THEN LOCATE#4,1,13-(NU*2):PRINT#4,USING"#";NU;
730 NU=NU-1
740 WEND
750 LOCATE#4,1,1:PEN#4,7:PRINT#4,"6 5 4 3 2 1 ";
760 CLS#5
770 RETURN
780 '"*** HOLD ***"
790 FOR V=1 TO 3:PEN#V,3:PAPER#V,15:CLS#V:NEXT
800 LOCATE 1,9:PEN 3:PAPER 1:PRINT"    HOLD    ";
810 F1=1:F2=1:F3=1
820 WHILE INKEY$<>"":WEND
830 IF INKEY(64)<>-1 THEN F1=-F1:PRINT#1,CHR$(24);:CLS#1
840 IF INKEY(65)<>-1 THEN F2=-F2:PRINT#2,CHR$(24);:CLS#2
850 IF INKEY(57)<>-1 THEN F3=-F3:PRINT#3,CHR$(24);:CLS#3
860 IF INKEY(47)<>-1 THEN LOCATE 1,9:PAPER 2:PRINT"                ";:RETURN
870 WHILE INKEY$="":WEND
880 GOTO 830
890 '"** SPIN REELS **"
900 R1=(R1+A) MOD(10)
910 R2=(R2+B) MOD(10)
920 R3=(R3+C) MOD(10)
930 CALL &9C52,a*8,b*8,c*8
940 GOSUB 320
950 RETURN
960 '"** RESET GAMBLE **"
970 PEN#7,15:LOCATE#7,1,1:PRINT#7,"TREBLOSEEVENLOSEEVENLOSEDOUBLOSE";:LOCATE#7,1
,1:PEN#7,3:PRINT#7,"TREB";
980 RETURN
990 '"*** PRINT SCREEN ***"
1000 FOR v=0 TO 15:INK v,0:NEXT:BORDER 0
1010 MODE 0
1020 WINDOW#1,1,4,11,22
1030 WINDOW#2,5,8,11,22
1040 WINDOW#3,9,12,11,22
1050 WINDOW#4,1,12,9,25:PAPER#4,2:PEN#4,5:CLS#4
1060 WINDOW#5,1,18,1,8:PAPER#5,4:CLS#5
1070 WINDOW#6,19,19,1,25:PAPER#6,5:PEN#6,4:CLS#6
1080 WINDOW#7,20,20,1,25:PAPER#7,4:PEN#7,5:CLS#7
1090 PRINT#6,"  * * M O S S O F T * *";
1100 PRINT#7,"  * * F R U I T I E * *";
1110 FOR v=1 TO 3
1120 PEN#v,5:PAPER#v,2
1130 FOR w=1 TO 12
1140 PRINT#v,CHR$(209);"  ";CHR$(211);
1150 NEXT:NEXT
1160 LOCATE#4,1,2:PRINT#4,t$;
1170 LOCATE#4,1,15:PRINT#4,t$;
1180 MOVE 0,142:DRAWR 382,0,3:MOVE 0,146:DRAWR 382,0
1190 IF FLAG=0 THEN CALL &9C52,1,1,1:FLAG=1 ELSE CALL &9C52,0,0,0:R1=R1+1:R2=R2+
1:R3=R3+1
1200 CALL &BB4E
1210 SC=200
1220 WINDOW#1,2,3,25,25
1230 WINDOW#2,6,7,25,25
1240 WINDOW#3,10,11,25,25
1250 WINDOW#4,13,13,9,20:PAPER#4,11:PEN#4,7
1260 WINDOW#5,14,14,9,20:PEN#5,14:PAPER#5,5:CLS#5
1270 WINDOW#6,13,18,21,25:PEN#6,1:PAPER#6,3:CLS#6
1280 WINDOW#7,15,18,9,20:PAPER#7,1:PEN#7,15:CLS#7:PRINT#7,"COLL    GAMB";
1290 WINDOW#7,15,18,13,20:GOSUB 970
1300 PRINT#4,"6 5 4 3 2 1 ";
1310 PRINT#6," CASH":LOCATE#6,1,3:PRINT#6,USING"###.##";SC/100;
1320 RESTORE 1460
1330 FOR v=1 TO 21
1340 READ t,s
1350 CALL &306A,t,s+64
1360 NEXT
1370 ORIGIN 0,0,500,502,350,348:CLG 4
1380 ORIGIN 0,0,0,640,400,0
1390 PLOT 194,390,5:TAG:PRINT"£1 ";
1400 FOR v=1 TO 3:READ n$:MOVER -96,-32:PRINT n$;:NEXT
1410 PLOT 482,390:PRINT"40p";
1420 FOR v=1 TO 3:READ n$:MOVER -96,-32:PRINT n$;:NEXT
1430 TAGOFF
1440 FOR v=0 TO 13:READ a:INK v,a:NEXT:INK 14,0,20:INK 15,3:BORDER 10
1450 RETURN
1460 DATA &c000,30256,&c008,30256,&c010,30256,&c0a0,30760,&c0a8,30760,&c0b0,3076
0,&c140,29488,&c148,29488,&c150,29488
1470 DATA &c1e0,29744,&c1e8,29744,&c1f0,29744,&c024,30000,&c02c,30000,&c034,3000
0,&c0c4,29232,&c0cc,29232,&c0d4,29232
1480 DATA &c164,29232,&c16c,29232,&c204,29232
1490 DATA 80p,60p,50p,30p,20p,10p
1500 DATA 9,24,20,6,26,0,2,13,10,12,14,16,18,22
1510 '"** END **"
1520 CALL &BC02:CALL &BB4E:MODE 1
1530 LOCATE 7,5:PRINT"YOU'VE LOST ALL YOUR MONEY!!"
1540 PEN 3:LOCATE 13,9:PRINT"PRESS ANY KEY TO"
1550 PEN 2:LOCATE 16,11:PRINT"TRY AGAIN."
1560 WHILE INKEY$<>"":WEND
1570 CALL &0010
1580 GOTO 140
1590 '"** ERROR TRAP **"
1600 CALL &BC02:CALL &BB4E:MODE 1:PRINT"ERROR ";ERR;" IN LINE ";ERL:END
```





FRUITIE

M K Mostowyj and his Amstrad turn you into a slavering degenerate gambler with a colourful print machine simulation.

Table 1.

Keys	Use
1:2:3	These are used to control holds and nudges for the three reels. When used for holds the keys work on a toggle on/off basis, so if you accidentally hold the wrong reel, press the same key and it will be released.
Space	This starts the reels spinning — assuming you still have money.
C:G	Used to choose either Collect or Gamble when you have a winning line.
Large Enter	If gamble is chosen this key is used to stop the flashing symbols on either Even, Doub, Treb or Lose. Your winnings are then adjusted accordingly.

FRUITIE IS A simulation of a penny arcade fruit machine. It includes all the usual features such as hold, nudge, gamble etc. The program is in two parts. Listing 1 is the Basic program that controls the above features plus pay-outs etc. Listing 2 is slightly over 2K in length but in fact pokes over 10K of data into memory. This data includes 9.9K for the reel graphics — 3.3K for each reel — and 353 bytes of machine code that are used to spin the reels and print the payout lines at the top of the screen.

Although listing 2 is discarded once it has poked the relevant data, it would be wise to save it on a separate tape in case of any mistakes you may make when entering the data lines. To get the program running is very simple, first of all enter listing 1 and save it to tape.

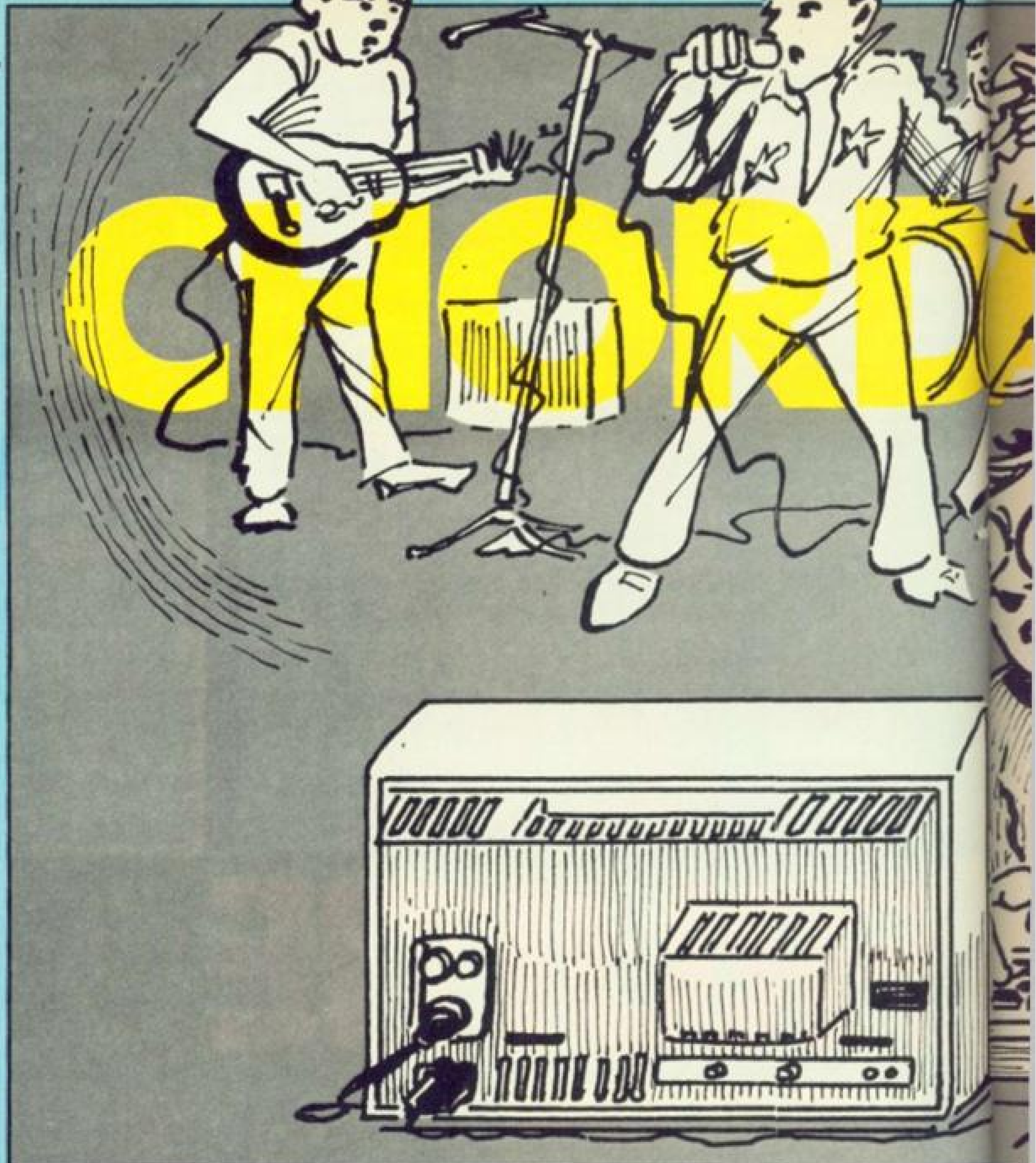
Do not run it at this stage as the machine code calls within it may cause the computer to crash. Secondly, enter listing 2 and, after saving it on a separate tape in case of mistakes, run it. If all is well, after a short delay the reel symbols should start appearing one by one in the top left corner of the screen.

After 39 of these have appeared and have been poked into memory, the data for the machine code is poked in, the screen will then clear and the save message will appear. The two sections of memory that are about to be saved should be saved directly after listing 1, so make sure the tape is wound to the correct position before inserting it and proceeding to save the bytes.

Once this is completed reset the computer, rewind the tape and run it. If all is well listing 1 should auto load the other two parts.

Listing 2.

```
10 SYMBOL AFTER 224:DIM a(8):FOR v=224 TO 253:FOR u=1 TO 8
20 READ x$:a(u)=VAL("&"+x$):NEXT
30 SYMBOL v,a(1),a(2),a(3),a(4),a(5),a(6),a(7),a(8):NEXT
40 des=29232:MODE 0:WINDOW#0,1,2,1,4:PRINT CHR$(22),CHR$(1):PAPER 4
50 FOR v=1 TO 39:READ a:ON a GOSUB 120,140,160,180,200,220:NEXT
60 MODE 1:PEN 1
70 FOR a=40000 TO 40352:READ b$:POKE a,VAL("&"+b$):NEXT
80 SAVE "CODE",b,29232,9984:SAVE "!CODE1",b,40000,353
90 END
100 z=&C000:x=z:FOR a=1 TO 4:FOR b=1 TO 8:FOR c=1 TO 8
110 POKE des,PEEK(z):z=z+1:des=des+1:NEXT:z=z+2040:NEXT:z=x+80:x=z:NEXT:RETURN
120 CLS:PEN 9:LOCATE 1,2:PRINT CHR$(226);CHR$(227);CHR$(228);CHR$(229);
130 GOSUB 100:RETURN
140 CLS:PEN 3:LOCATE 1,2:PRINT CHR$(230);CHR$(231);CHR$(232);CHR$(233);:LOCATE 2
,2:PEN 12:PRINT CHR$(234);
150 GOSUB 100:RETURN
160 CLS:PEN 5:LOCATE 1,2:PRINT CHR$(235);CHR$(236);CHR$(237);CHR$(238);
170 GOSUB 100:RETURN
180 CLS:PEN 3:LOCATE 1,2:PRINT CHR$(239);CHR$(240);CHR$(241);CHR$(242);:PEN 12:L
OCATE 1,2:PRINT CHR$(224);CHR$(225);
190 GOSUB 100:RETURN
200 CLS:PEN 6:LOCATE 1,2:PRINT CHR$(244);CHR$(245);CHR$(246);CHR$(247);:PEN 12:L
OCATE 2,2:PRINT CHR$(248);
210 GOSUB 100:RETURN
220 CLS:PEN 13:LOCATE 1,2:PRINT CHR$(249);CHR$(250);CHR$(251);CHR$(252);:PEN 12:
LOCATE 2,2:PRINT CHR$(253);
230 GOSUB 100:RETURN
240 DATA 02,01,01,00,00,00,00,00,C0,E0,E0,F0,F0,F0,F0,1F,3F,3F,3F,3F,03,01,00
250 DATA 01,03,07,07,0F,0F,0F,1F,00,C0,E0,E0,F0,F0,00,00,00,80,C0,E0,60,C0
260 DATA F8,FC,FC,FC,FC,C0,00,00,00,00,00,00,07,0F,1E,1F,1F,00,00,00,00,00,00,00,00
270 DATA 03,3D,7E,F6,FB,FF,7E,3C,BC,7E,F7,7B,7F,7E,3C,00,0F,F8,00,00,00,00,00,00
280 DATA FF,55,AA,FF,00,E1,92,E3,FF,55,AA,FF,00,8E,49,CE,92,E2,00,FF,55,AA,FF,00
290 DATA 49,49,00,FF,55,AA,FF,00,00,04,1E,37,3D,6F,7E,2F,00,10,78,EC,FC,8E,F6,DC
300 DATA 3F,1B,0E,0F,05,07,03,01,7C,D8,F0,F0,A0,E0,C0,80,04,02,03,00,00,00,00,00
310 DATA 00,00,00,00,03,03,07,07,00,00,00,00,F0,D8,D8,DC,0F,0F,0F,07,07,03,03,01
320 DATA EC,FC,FC,F8,F0,F0,E0,C0,8C,70,40,F0,00,00,00,00,00,00,00,00,00,01,03,03
330 DATA 00,00,00,80,C0,C0,60,60,03,07,0F,1F,1F,1F,0F,07,A0,E0,F8,FC,FC,FC,F8,F0
340 DATA 1C,78,C0,00,00,00,00,00
350 DATA 2,4,5,6,3,2,1,6,5,4,2,4,5,3,6,4,2,1,3,5,4,6,2,3,6,4,1,3,2,6,4,5,1,6
360 DATA 5,4,1,3,2
370 DATA 00,00,00,00,80,00,30,79,24,C3,30,56,34,C3,30,93,44,C3,DD,7E,00,32,44,9C
,DD,7E,02,32,42,9C,DD,7E
380 DATA 04,32,40,9C,3A,40,9C,FE,00,28,40,3D,32,40,9C,06,60,C5,01,00,00,2A,4E,9C
,ED,5B,48,9C,D5,ED,B0,22
390 DATA 46,9C,E1,01,00,00,09,30,04,01,50,C0,09,22,48,9C,C1,10,DE,21,24,C3,22,48
,9C,2A,46,9C,11,20,03,A7
400 DATA ED,52,3E,72,BC,20,09,3E,30,ED,20,04,11,00,0A,19,22,46,9C,3A,42,9C,FE,00
,28,48,3D,32,42,9C,06,60
410 DATA C5,01,00,00,2A,4A,9C,ED,5B,4C,9C,D5,ED,B0,22,4A,9C,E1,01,00,08,09,30,04
,01,50,C0,09,22,4C,9C,C1
420 DATA 10,DE,21,34,C3,22,4C,9C,2A,4A,9C,11,20,03,A7,ED,52,3E,7F,BC,20,09,3E,30
,ED,20,04,11,00,0A,19,22
430 DATA 4A,9C,2A,44,9C,FE,00,20,11,3A,42,9C,FE,00,C2,64,9C,3A,40,9C,FE,00,C2,64
,9C,C9,3D,32,44,9C,06,60
440 DATA C5,01,00,00,2A,4E,9C,ED,5B,50,9C,D5,ED,B0,22,4E,9C,E1,01,00,08,09,30,04
,01,50,C0,09,22,50,9C,C1
450 DATA 10,DE,21,44,C3,22,50,9C,2A,4E,9C,11,20,03,A7,ED,52,3E,8C,BC,20,09,3E,30
,ED,20,04,11,00,0A,19,22
460 DATA 4E,9C,C3,64,9C,C9,F0,72,A4,C2,DD,4E,00,DD,66,01,22,66,9D,DD,4E,02,DD,66
,03,22,68,9D,06,10,C5,01
470 DATA 00,00,2A,66,9D,ED,5B,68,9D,D5,ED,B0,22,66,9D,E1,01,00,08,09,30,04,01,50
,C0,09,22,68,9D,C1,10,DE,C9
```



THE CHORD symbol system, along with the rest of music notation, has archaic origins, and has evolved to its present day state. The result is a system that, although reasonably consistent, is cluttered, widely misinterpreted and full of conventions, i.e., rules having little logical basis and so only learnable by experience.

However, like the English language — and Basic? — at least it has the advantage of having settled down into an established standard, agreed on by almost all; even a 1930's jazz musician could follow most of what's printed on a modern Casiotones chord buttons! This program boils chord structure for guitarists down into a very *easy to use* expert system.

It accepts any chord name typed in simply as read from sheet music, and takes into account all recognised variants by which chords are known — but if you type in rubbish don't blame me for the results! Unlike chord books or simple chord programs, which store a few standard chord shapes, Chordata scratch builds each chord you ask it.

This makes it extremely flexible and able to work out virtually *any* chord, of any type, whether old, contemporary or yet to be fashionable, in any key, at any fret position, and *also* for any tuning of any stringed instrument; a total of many thousands of chords. Although it works from theory it also weeds out what experience tells me are impractical combinations of notes e.g., an eleventh chord *technically* includes a third as well as a fourth, but the third is omitted in practice.

Eventually — well, six seconds — you are given a simple display of the guitar neck, showing finger positions as you would see them if playing your guitar in front of a mirror. Some people prefer the more conventional — but illogical — view with treble strings uppermost, so I have included a control to flip between

```
   0 REM CHORDATA J.Dave.Rogers/
      Walton,Liverpool/1984
   5 RUN 2000
   9 REM
              NEW CHORD
  10 BORDER 0: PAPER 0: INK 1: B
RIGHT 0: CLS : PRINT h$;#0; FLAS
H 1;"Press any key"
  20 BRIGHT 1: INK RND*8: LET x=
INT (RND*5)*7: LET y=1+INT (RND*
5)*4: PRINT AT y,x;"BMIU";AT y+1
,x;"KL"
  30 IF INKEY$="" THEN GO TO 20
  40 BORDER 1
  50 POKE 23617,253: POKE 23609,
     22: POKE 23658,0
  60 INPUT ( FLASH 1; PAPER RND*
7; INK 9);"   Please enter chord
 required   "; LINE c$
  70 LET c$="...."+c$+"........"
  80 LET p=4: GO SUB 1000: LET
root=v: IF root=0 THEN GO TO 10
  90 LET b$="R...3..5....": LET
     bass=0
  99 REM
               FIRST SEARCH
 100 FOR p=5 TO LEN c$-7: LET p$
     =c$(p): LET x$=c$(p TO p+1)

 110 IF x$="11" THEN LET b$=
     "r.9..4.f..7."
 120 IF x$="13" THEN LET b$=
     "r.n.3..5.67."
 130 IF x$="-5" OR x$="b5" OR x$
   ="5b" THEN LET b$(7 TO 8)="5."
 140 IF x$="di" OR (p$="o" AND
     c$(p-1)<>"j") THEN LET b$=
     "R..3..5..7.."
 150 LET x$=c$(p TO p+2)
 160 IF x$="aug" OR p$="+" OR x$
( TO 2)="#5" OR x$="(5#" THEN LE
T b$(8 TO 9)=".5"
 170 IF x$="no3" THEN LET b$(4
     TO 5)=".."
 180 IF x$="no5" THEN LET b$(7
     TO 8)=".."
 190 IF c$(p+1 TO p+3)="ass" THE
N LET c$(p)="B": LET p=p-1-(c$(p
-2)="a" AND c$(p-2)<="g"): GO S
UB 1000: LET bass=v: LET p=p+4
 200 NEXT p
 205 REM ---------------
 210 LET a$=b$: IF b$(5)="3" THE
N LET b$(5)="t"
 220 REM
               SECOND SEARCH
 230 FOR p=5 TO LEN c$-7: LET x$
     =c$(p TO ): LET p$=c$(p)
 240 IF p$="/" THEN IF x$(2)>="a
" AND x$(3)<>"d" AND x$(2)<="g"
THEN LET p=p+1: GO SUB 1000: LET
     bass=v
 250 IF p$="m" AND x$( TO 3)<>"m
aj" THEN LET b$(4 TO 5)="t.": LE
T a$(4 TO 5)="3."
 260 IF p$="6" OR x$( TO 2)="13"
 THEN LET b$(10)="s": LET a$(10)
="6": IF a$(8)="5" THEN LET
     a$(8)="f"
 270 IF p$="7" THEN IF a$(12)<>"
7" AND a$(10)<>"7" THEN LET a$(1
1)="7": LET a$(1)="r": LET b$
     (11)="s"
 280 IF x$( TO 3)="sus" OR p$="4
" THEN LET a$(5 TO 6)=".4": LET
     b$(5 TO 6)=".u"
 290 IF x$( TO 3)="-10" THEN LET
     a$(4)="9"
 300 IF x$( TO 4)="maj7" OR x$(
TO 4)="maj9" THEN : LET a$(12)="
7": LET a$(1)="r": LET b$(12)="s
"

 305 IF x$( TO 2)="11" THEN LET
     b$(1)="R": LET b$(3)="n"
 310 REM ---------NINTHS----------
 320 IF p$<>"9" THEN GO TO 390
 325 LET x$=c$(p-1): LET n=(x$="
#")-(x$="b" OR x$="-"): IF n THE
N LET a$(3+n)="9": LET a$(3)=
     ".": LET b$(3)=".": GO TO 390
 330 LET a$(3)="9": LET b$(3)="n
": LET a$(1)="r": IF a$(5)="3"
     THEN LET a$(5)="t"
 340 IF p>5+2+sh/ THEN GO TO 390
 350 PRINT #0; FLASH 1;"Jazz or
added ninth ?"
 360 LET k$=INKEY$: BEEP RND/4,
     RND*22
 370 IF k$="" THEN GO TO 360
 380 IF k$="j" THEN LET a$(11)="
7": LET b$(11)="s": IF b$(5)="t"
     THEN LET b$(5)="3"
 390 NEXT p
 391 REM ----------------
 395 INPUT "": PRINT ;#0; FLASH
1;" working out ";c$
 400 REM
               ADJUSTMENTS
 410 IF a$(10 TO 11)="67" THEN L
ET a$(10 TO 11)="6s": LET b$(10
     TO 11)="s7": LET b$(1)="r"
 415 FOR n=3 TO 4: IF a$(n TO n+
1)="93" THEN LET a$(n TO n+1)=
     "9t": LET b$(n TO n+1)="n3"
 420 NEXT n
 430 LET a$=a$(14-root TO )+a$
 440 LET b$=b$(14-root TO )+b$
 450 IF bass THEN : LET root=bas
s: FOR n=bass-2 TO bass+2: LET p
=n+12*((n<1)-(n>12)): LET b$(p)=
("N" AND b$(p)<>".")+b$(p): NEXT
 n: LET b$(bass)="B"
 460 LET i$="DDDDDDDDDDDDD"
 470 LET j$="AAAAAAAAAAAAA"
 480 FOR n=1 TO LEN a$
 490 IF a$(n)="." THEN LET a$(n)
="D": GO TO 510
 500 LET i$(n)="MN"(1+(a$(n)="s
"))
 510 IF b$(n)="." THEN LET b$(n)
="A": GO TO 530
 520 LET j$(n)="MN"(1+(b$(n)="s
"))
 530 NEXT n
 540 LET j$(root)="■"
 550 REM ---FILL-PLAY-ARRAY---)
 560 DIM p(48): LET pa=1: LET p(
1)=root-13: LET s$=b$+a$
 570 FOR n=1 TO LEN s$
 580 IF s$(n)<CHR$ 128 THEN LET
     pa=pa+1: LET p(pa)=n-1
 590 NEXT n
 600 REM
           FILL GUITAR STRINGS
 610 FOR s=1 TO 5
 620 LET g$(s)=(u$ AND s<4)+v$
 630 LET g$(s+5)=g$(s)
 640 IF s>3 THEN LET b$=a$: LET
     j$=i$
 650 BEEP .01,42+s
 660 FOR f=1 TO 19: LET g$(s,f+4
)=b$(n(s,f)): LET g$(s+6,f+4)=
j$(n(s,f)): NEXT f
 670 IF g$(s,4)<>g$(s,5) THEN
    : LET g$(s+6,2)="o"
 680 NEXT s
 700 REM -----PRINT-OUT-----
 710 BORDER VAL "7775017310"(1+c
ol): INK 9: PAPER 7*(col=2*INT (
col/2)): BRIGHT col=6 OR col=7

 720 CLS :::::::::::::::: PRINT "
```



Find that chord with the push of a button. J. Dave Rogers and a ZX-81 explain how to fret without worrying.

either view. Keys Z and X let you scan up and down the neck to see different frets. The neck display is held in an array — GS — using one character string per guitar 'string'. Several UDG's are used for the frets and thick/thin strings. For beginners, a simplifier can be selected which shows chords as small, easy-to-grasp shapes to play.

For more advanced players the simplifier can be switched off so that a greater length of the fretboard can be seen at one time. This mode shows not only all the notes usable for a given chord but also their *scale relationships* e.g. root, third, ninth, etc, which is useful for learning about harmony and the anatomy of chords, or as an aid to composing solo runs — or bass guitar runs — to fit in with a given chord sequence.

As far as fingering the chords is concerned, an obvious shape will usually suggest itself. The more complex types of chords however can have several alternative ways of being played. There may even be two notes indicated on the same string within a few frets of each other and they obviously can't both be played, even though *they are all legitimate notes for that chord.*

So, to help sort out which to choose I have made 'top priority' notes appear in capitals, with less important or optional notes in lower case letters. Although all the 'standard' chord shapes can be seen, the program can also throw up, if you'll pardon the expression, less common ways of playing chords.

Don't be conservative, try them all, see which *you* prefer — you've nothing to lose but your fingernails — and remember that each inversion may be just what's needed to suit a particular piece of music rather than the others.

Also, carefully chosen *parts* of a chord — residues — can sound just as strong as a huge six-string-five-fret-wrist-wrecker, especially when playing in combination with other instruments — or a good echo-chorus unit!

There now follows a potted chord theory: A chord symbol such as E means the basic chord of E major, which consists of the first — root, third and fifth steps of the rising major scale of, in this case, E — and their octaves. Minor, sus 4, augmented and flattened fifth chords are formed by *altering* — raising or lowering — the third or the fifth.

Added notes can then include the sixth, various sevenths, ninths, and so on, in any combination. The added notes generally sound better if confined to the higher-pitched strings, so the program indicates this automatically. In fact, if a seventh or other added note is required as a bass note than it can be written not as a seventh but as 'chord over bass note' e.g. D/C, and this notation is allowed for in the program.

It became more common as the main system failed to *conveniently* describe some contemporary chords, e.g. if the chord A/D had to be named with D as its root — but still as *exactly* the same notes — it would be called D maj 7/9/no 3rd. The newer notation is more descriptively accurate, yet short to write and quick to understand (like good computer language should be!).

If typing errors are made when entering games programs then something obvious will usually happen — or at least fail to happen — but with a utility/educational program, such as this one, errors may give you an *apparently*

(continued on next page)

```
CHORDATA
  P=Play                 J.D.Rogers
  N or A-G=New chord          ©84
  Z/X=Scan down/up frets
  V=Alter view. 0-9=Colours
  S=Simplifier steps. T=Re-tune"
 740 PRINT ,," THIS IS "; INK VA
L "1646263624"(1+col);c$;AT 21,1
;"FRET ";f0;" Gtr Tuning ";t$
 750 PAPER col
 760 IF simp<>2 THEN GO TO 800
 770 DIM q$(384): PRINT AT 8,0;q
$
 780 PRINT AT 9,21;"█ and M";TAB
 20;"main finger";TAB 20;"positi
ons";TAB 21;"(█=root)";AT 14,19;
"N Play if no";TAB 20;"alternati
ve";AT 17,19;"Do not play";TAB 1
9;"open strings";TAB 19;"unless=
o"
 800 PRINT AT 8,0;"
";AT 20,0;"

 810 LET x=6 AND simp: LET a=
    fr+31-(14 AND simp=2)
 820 PRINT PAPER 8;AT 21,6;"
"; FLASH 1;AT 21,6;(fr+2)/4
 830 PRINT AT 8,0
 840 FOR s=1 TO 5: IF view THEN
    FOR s=6 TO 2 STEP -1
 850 PRINT g$(s+x,fr TO a): PRIN
T e$(fr TO a)
 860 NEXT s
 870 PRINT g$(s+x,fr TO a)
 890 REM
          USER CONTROLS
 900 IF play THEN FOR n=1 TO pa:
 BEEP .02+simp/8,p(n): IF INKEY$
    ="" THEN NEXT n: GO TO 900
 910 LET k$=INKEY$
 915 POKE 22539+RND*7,8*INT (PEE
K 22539/8)+1+RND*5
 920 IF k$="" THEN GO TO 910
 930 IF k$="p" THEN LET play=NOT
    play
 940 IF k$>="0" AND k$<="9" THEN
  LET col=CODE k$-48: GO TO 700
 950 IF k$="n" THEN GO TO 10
 960 IF k$>="a" AND k$<="g" THEN
    GO TO 40
 970 IF k$="v" THEN LET view=NOT
    view
 980 IF k$="s" THEN LET simp=VAL
    "201"(1+simp): GO TO 750
 990 LET fr=fr+(4 AND k$="x" AND
    fr<45)-(4 AND k$="z" AND fr>4)
 991 IF k$<>"t" THEN GO TO 800
 992 REM ----OPTIONAL-RETUNER---
 993 CLS : PRINT ,," Enter tunin
g required for six strings,bass
 string first,using this exact f
orm:e.g.",,"  d:a:e:a:b:e:",,,"
 (example is jdr's D6/9 tuning)"
,,,"OR:Enter n to return to norm
al"
 994 INPUT LINE T$: CLS : IF LEN
    T$>12 THEN GO TO 4020
 995 IF T$="n" THEN RUN
 996 GO TO 992
1000 REM
          NOTE-TO-NUMBER
1010 LET p$=c$(p): LET c$(p)=
    CHR$ (CODE p$-32)

1020 LET v=0
1030 FOR n=1 TO 7
1040 IF p$="cdefgab"(n) THEN LET
 v=VAL "01030506081012"(n*2-1 TO
 n*2)
1050 NEXT n
1060 LET shf=(c$(p+1)="#")-(c$
    (p+1)="b")

1070 IF shf THEN LET v=v+shf: LE
T p=p+2: LET c$=c$( TO p-1)+" "+
 c$(p TO )
1080 RETURN
2000 REM
          SETTING-UP
2010 PRINT "Please wait"
2020 LET f=0: LET s=0: DIM g$(12
,78): DIM n(6,20): DIM a$(12): D
IM b$(12): DIM j$(12): LET fr=2:
 LET x$="": LET col=6: LET simp
 =0: LET view=0: LET play=0
2030 LET u$="  AAAB"
2040 LET v$="  DDDE"
2050 LET e$="     █"
2060 : FOR n=1 TO 20
2070 LET u$=u$+"AAAC"
2080 LET v$=v$+"DDDF"
2090 LET e$=e$+"   █"
2100 : NEXT n
2110 LET e$(52)=":"
2120 LET h$=" b  ?  #  "
2130 LET h$=h$+h$: IF LEN h$<700
    THEN GO TO 2130
2140 LET h$=h$( TO 704)
2150 IF LEN (a$+b$+j$+x$+g$(12)+
u$+v$+e$+h$)<>1076 THEN PRINT "E
RROR in lines 2000 to 2150",,jdr

3000 REM -----------UDG's---------
  A B C D E F G H I J K L M N O
  A B C D E F G H I J K L M N O
3010 DATA 0,0,0,0,255,170,0,0,25
5,255,255,126,255,170,126,255,15
,15,15,15,255,170,15,15,0,0,0,0,
255,0,0,0,255,255,255,126,255,12
6,255,255,15,15,15,15,255,15,15,
15
3020 DATA 0,3,63,29,13,13,253,12
7,56,252,252,248,95,85,248,124,0
,0,0,0,255,85,0,0,0,0,0,24,252,9
5,0,0,19,96,64,48,8,48,192,128,2
52,48,0,0,0,0,0,0: REM "guitar"

3030 DATA 24,60,110,235,215,118,
60,24,0,0,16,84,255,84,16,0,74,4
6,68,97,118,101,46,82,111,103,10
1,114,115
3040 FOR n=USR "a" TO USR "p"
3050 READ f: POKE n,f: LET s=s+f
3060 NEXT n
3070 IF s+n<>76042 THEN PRINT "e
rror in data",jdr

4000 REM --TUNE-UP-NOTES-ARRAY--
4010 LET t$=":e:a:d:g:b:e:"
4020 LET c$=t$: LET p=2
4030 FOR s=1 TO 6
4040 GO SUB 1000
4050  FOR f=1 TO 20: LET n(s,f)=
 v: LET v=(v AND v<12)+1: NEXT f
4060 LET p=p+2
4070 NEXT s
4080 PRINT AT 20,0;"test chord":
  LET c$="dmaj7/9/f#bass": LET
 simp=2: GO TO 70
4090 GO TO 10

9996 REM
          POKE UDG's TO LETTERS
     WITH A "STRIPE" FOR LISTING
9997 LET ad=15880: FOR n=USR "a"
 TO USR "p": POKE n,PEEK ad+128:
 LET ad=ad+1: NEXT n
9998 REM Thanks to Els+Les(tea+
     typing)
9999 POKE 23693,56: CLS : BORDER
 7: PRINT "instant normality": L
IST 3e3
```

Table 1.
Spectrum-specified Pokes etc.

0	A zero line is obtained by the direct command: Poke 23756,0.
10	h$ is a screen-sized string used as a 'backdrop'.
50	The first Poke changes the Input-cursor character, the second Poke makes the Spectrum's key-beep more audible and the third Poke switches Caps-shift off.
60	'Line' allows string input without the quotes being shown.
395	Performs a CLS on the bottom two lines only, *#0* Prints to the bottom of the screen.
450	use of boolean logic with b$ allows a 'complete algorithm within a line'. Use of 'If's would have caused the rest of the line to be ignored if a condition was false.
560	Sinclair arrays can be re-dimensioned even when already set up.
500/520	The first or the second of the characters in quotes is sliced out depending on whether b$(n) is an upper-case or lower-case character.
710	Border colours are sliced directly out of a string using 'Val'.
720	Using one big string takes less memory and prints faster than if using lots of separate 'Print At's.
840	If 'view' equals one then the second version of the For-Next loop is set up and the one that was first set up is ignored. *Not* recommended on non-Sinclair machines!
915	Pokes the attributes file to flash random *INK* colours only. The bits that are significant for Paper/Flash/Bright are masked off by the function 8* INT (Peek/8).
2150	Checksum for strings.
3070	Checksum for UDG data.
9997	Reads character bit-patterns from the Rom and Pokes them into the UDG's, but by adding 128 a 'stripe' is added down one side to highlight the UDGs in the listing. Adding 129 would give a stripe on the other side as well.

R	r	Root note of chord
B		Bass (if altered root)
3	t	Third (minor or major)
5	f	Fifth (flattened, perfect or augmented)
7	s	Seventh (diminished, dominant or major)
6	s	Sixth
9	n	Ninth (flattened, dominant or sharpened)
4	u	Fourth (suspended or eleventh)
If a main note.		If an optional note.

(continued from previous page)

working program but one that spouts a load of misleading rubbish. I made up the (rather unlikely) 'test chord' in line 4080 to test as many parts of the search algorithm as possible.

If you do not get *exactly* what's shown in figure 1 then there is an error somewhere. When a Run gives the correct result you can erase line 4080, then make final copies using Save "chordata" line 1.

User-definable characters — to be entered in Graphics mode — are highlighted in the listing as capital letters *with a stripe*. To return them to this form, for checking, you must Run 9000 — this copies character bit-patterns from the Rom. It is also most important to notice where capital or small letters are used in the listing, because this is used as a note-priority marker.

For this reason check all lines in the search loops even more carefully than usual. Note that some lines in the listing have been padded out with spaces to clarify their appearance. Lines 540, 780 and 2050 use graphic shifted eight (*not* inverse video space).

In use, the 'sharp' sign can be found on key 3. For flats, as on all music, a small b is used. If you come across a natural sign — — then type maj instead. It is *not* necessary to put capitals or spaces when typing in a chord, these will be inserted later by the program itself where needed for clarity e.g. Type in abbbbass and see how the four b's get sorted out into Ab/Bb Bass.

Figure 1.

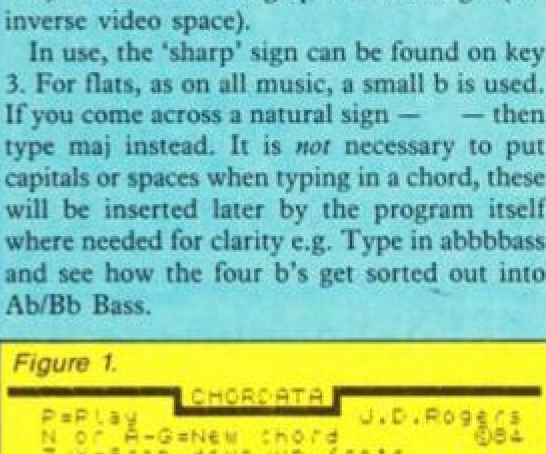


Table 2. Main Variables.

C$	Chord name, inputted by user.
B$	'Allowed notes' for given chord (separate sets for
A$	bass/treble strings).
X$	Extracted items from C$
P	Pointer for search through C$
V	Value returned from note-to-number subroutine.
root	Root note of chord.
bass	New root note if 'altered bass'
i$/j$	Simplified versions of b$/a$.
g$(s)	Guitar 'strings', literally.
e$	Empty string, used to keep the guitar strings spaced-out.
N(s,f)	Notes reference array (string, fet)
col	Colour/options for display
T$	Tuning for open guitar strings
Simp	Simplifier, on/off
view	View, up/down 'flags', 0 = off
play	Play notes, on/off
Shf	Sharps and flats
p (pa)	Play-array

For 9th chords you are prompted to choose jazz or added, the former includes a seventh, the latter doesn't and sounds more contemporary — used extensively by The Police. Any chord +7 means augmented fifth and dominant seventh, *not* a sharpened seventh. A 13th chord includes the sixth and seventh, usually an octave apart, sometimes the ninth, optionally the fourth and theorectically the root, third and fifth.

If the program is typed in error-free (!) then at least 99.9 per cent of chords typed-in off sheet music will be worked out correctly. Don't believe those who tell you "that's not how I play" whatever, many guitarists have their own somewhat loose idea of chord names.

Even sheet music is not infallible and can contain chord shapes or names that are unsuitable or just plain wrong e.g. G eleventh (G11) is used sometimes to mean F/G but sometimes to indicate G7 sus 4.

Structure-wise (horribobble word) the program flows straight through from line 10 to 900. The main variables to try and follow are a$, b$, c$, p and x$. Both searches through the inputted chord name (c$) use a pointer (p) to keep track of everything. P is incremented for example to accommodate "sharps and flats' in the routine at 1000. Allowed notes for the chord in question are built up in a$ — for the three treble strings — and in b$ — for the three bass strings. B$ gets started off containing a major triad in line 60.

The filling of the actual guitar-strings array (G$) is all done in line 660 as follows: For each guitar-string/fret position (S, F) the fixed reference array N is sliced to find the note-value at that S, F. The resulting number — range 1 to 12 — is used to slice out a character from a$/b$ — allowed notes data — which is then put into G$ at the current string/fret.

Table 3. Some chords to try, from simple to complex, showing just some of the types that may be found on sheet music.

E7	D	Dm7	Fmin	Am
Am(maj 7)		Am7	Bb6	C7-9
F	F6/4	Esus	Eaug	D/E
C(Bb	Am/F	B7-10		Em(add 9)
Cm7/9		A7(b9)		Abmaj7
B9		A6/4/GBass		Dmajg
Bbm7		C11		F/#dim
F/# m7(5b)		G	A13	D(9)

This character could be a symbol or just a bit of guitar string — to fill the gap — depending on whether the note was an allowed one for the current chord or not.

Since the Spectrum Beep is monophonic — not to mention barely audible — the only way to give at least an impression of a chord is to play the notes of the chord rapidly in succession. This is done by storing the notes of the chord into a play array, P — sound better through a proper amp.

Note that throughout this program I use 1 to represent C, 2 for C sharp, 3 for D and so on. The Spectrum's Beep uses the same system but one lower (0 = C) hence the need for 'n-1' in line 580.

I can supply a ready-taped version of Chordata which includes extra text screens. Send £2.50 to 11 Carnarvon Road, Walton, Liverpool, L9 1EB. Note that I refuse to have anything to do with fans of Wham! ■



SP

J G Fountain gives your Amstrad a schizoid screen.

THE PROGRAM Split uses the built in interrupt facilities on the Amstrad to split the display into separate areas and provide them with separate colour pallettes, thus allowing the machine to have more colours on screen than normal. The program actually splits the screen into two sections, the upper retaining the normal screen pallette and hence responding to the normal Basic commands for controlling the ink colours.

The lower area however is given a completely new pallette and hence new commands have to be provided to control the inks though the colours available are the same 27 hardware colours.

The new commands are provided using Resident System Extensions, which have been well described in various publications and are fully documented in the *Complete CPC 464 Operating System Firmware Specification Soft 158*. Basically an RSX command is a user defined extensions to the Basic language and provides a method for calling machine code routines by name rather than address.

For the control of the lower area of the screen 4 RSX commands are provided:-

:SPLIT,p,n, — splits the screen at position p where p is in the range of 0 to 4, 0 being the bottom of the screen and 4 being the top. n inks are associated with the new pallette ie. if n=0 none of the inks are changed in the lower area of the screen, if n=16 then all of them are changed the border always being split.

:SPLITOFF — returns the display area to its normal format.

:LOINK,i,c — sets ink i to colour c in the lower area of the screen.

:LOBORDER,c — sets the border to colour c in the lower area of the screen.

These RSX's have to be initialised by the Basic instruction

CALL 34000

though this address can be changed by changing the two ORG definitions in the assembly pro-

```
;                       RSX INITIALISATION ROUTINE
;                       --------------------------
;
; This routine is called from basic and initialises the RSX commands.
;
RINIT:  ORG 34000
        LD BC,RCMDTB            ; Address of command table
        LD HL,RWRKSP            ; Address of work space
        CALL &BCD1              ; KL LOG EXT
        RET                     ; Return to basic
;                       SPLIT SCREEN COMMAND ROUTINE
;                       ----------------------------
;
; This routine is called when the RSX command SPLIT,n,m is found by the Basic
; Interpreter.  It splits the screen at position 'n', providing a new palette
; for the first 'm' inks.  If there are no parameters it defaults to SPLIT,1
; If there are too many parameters it exits via the Error routine.
;
SPLIT:
        CP 0                    ; Check for parameters
        JR NZ,SPRAM             ; If at least one jump to handle it
        LD A,4                  ; Else default to SPLIT,1
        LD (POSTN),A            ;
        LD A,46                 ;
        LD (DELAY),A            ; Set loop counter
        JR SPIN                 ; then jump to initialise Ticker blocks
SPRAM:  CP 1                    ; Check if  there is 1 parameter
        JP Z,SP2                ;   Jump to Handle it
        CP 2                    ; Check if there are 2 parameters
        JP NZ,PCERR             ; Jump to error routine if not
;
;           SET NO OF INKS TO BE CHANGED
;
        LD A,(IX)               ; Get lo byte of P2
        CP 17                   ; Limit the parameter
        JR C,SP4                ;  to between 0 and 16
        LD A,16                 ;
SP4:    LD (LIMIK),A            ;
        INC IX                  ; Point parameter stack pointer at
        INC IX                  ;  the first parameter on the line
;
;           SET SPLIT POSITION
;
SP2:    LD A,(IX)               ; Get parameter
        ADD A,3                 ; Limit the parameter value
        AND 7                   ; to between 3 and 7
        LD E,A                  ; Save the split position parameter for later
        SUB A,3                 ; Bring back to range 0 to 4
        LD BC,LOOPTAB           ; Get the loop table start address
        ADD A,C                 ; Add offset ( ADD BC,A )
        LD C,A                  ;
        JR NZ,SP1               ;
        INC B                   ;
SP1:    LD A,(BC)               ; Get the loop driver value from table
        LD (DELAY),A            ; Load loop driver temp. store
        LD A,E                  ; Get the split position parameter again
        LD (POSTN),A            ; Set split position variable
;
;           INITIALISE FRAME FLYBACK
;
SPIN:   LD HL,FXBLK             ; Address of Frame Flyback Event block
        LD B, &81               ; Class of interrupt. Asynchronous Event
                                ;  with a routine in RAM
        LD C, &FF               ; Rom number. Not applicable
        LD DE,FFRTN             ; Address of routine
        CALL  &BCD7             ; KL NEW FRAME FLY
;           INITIALISE FAST TICKER BLOCK
;
        LD HL,FTBLK             ; Address of Fast Ticker Event block
        LD B, &C1               ; Class of interrupt. Asynchronous Express Event
                                ;  with a routine in RAM
        LD C, &FF               ; Rom number. Not applicable
        LD DE,FTRTN             ; Address of routine
        CALL  &BCE0             ; KL NEW FAST TICKER
        RET                     ; Return to Basic
;                       FAST TICKER ROUTINE
;                       -------------------
;
; This routine is called every 3.33 mS.  It checks where the screen scan has got
; to and if this matches the split position then the ink colours are  changed.
;
FTRTN:
        LD A,(FCOUNT)           ; Get the frame position counter
        LD HL,POSTN             ; Get position at which to split the screen
        CP (HL)                 ; Check if they are equal
        JR NC,FTPASS            ; If they are not the same, do not change the
;                                  palette
;
;       LOAD IN THE NEW PALETTE
        LD A,(DELAY)            ; Get delay time length
        LD B,A                  ; Move it into B
FTLOOP: DJNZ FTLOOP             ; Delay loop to get change of
                                ;  colours at character line boundry
        LD B,&7F                ; Load Gate array address into B
                                ;  since B is put on the upper 8 Bits of the
                                ;  Address Bus During the OUT (C) instructions
        LD A,(LIMIK)            ; Check No. of inks to be changed
        CP 2                    ; If A < 2 change colours the slow way
        JR C,FTFEW              ; Else do the border and the
        LD HL,INKTAB            ;  first two inks as fast as possible
        PUSH AF                 ; Save limit of inks to be changed
        LD D,L                  ; Load the spare registers with the
        LD E,(HL)               ;  ink numbers and colours of the first
        LD A,(BORCOL)           ;  two inks to be changed and the border
        LD C,&10                ;  which is also changed at this point
        INC HL                  ;
        PUSH HL                 ; Save ink table pointer
        LD H,(HL)               ;
        OUT (C),D               ; Output the ink Nos. and colours
        OUT (C),E               ;
        OUT (C),C               ; Border No.
        OUT (C),A               ; Border colour
        OUT (C),L               ;
        OUT (C),H               ;
        POP HL                  ; Get the ink table pointer
        INC HL                  ; Increment it to 2
        POP AF                  ; Get the limit of inks
        JR Z,FTPASS             ; If there were exactly 2 inks to change
        JR  FTOUT               ; Else continue outputing inks
;
FTFEW:              ; Entered if 1 or no inks to change
        LD L,&10                ; Set Gate address
        OUT (C),L               ;
        LD A,(BORCOL)           ; Get the border colour
        OUT (C),A               ; Send it to Gate Array
        LD HL,INKTAB            ; Get the start of ink the table
        LD A,(LIMIK)            ; Get the number of inks to set
        CP 0                    ; Check if no inks to change
        JR Z,FTPASS             ;  ie only the border
        DEC A                   ; Decrement the limit as L starts at 0
;
FTOUT:  OUT (C),L               ; Set Gate Array for ink (L)
        OUTI                    ; Set its hardware colour
        INC B                   ; Reset B
```

PLIT

gram, the latter of these two must however be of the form &XXOO.

The mechanism by which the screen is split uses two of the interrupt queues, the Frame Flyback Queue and the Fast Ticker Queue. These interrupt queues are again described in the *Firmware Specification Soft 158*. Again briefly these allow the user to write machine code routines which are called not from basic in the normal manner but periodically in a similar manner to the way the Basic Instruction Every works and hence operate without the User needing to be concerned with driving them.

The Frame Flyback interrupts occur as the name suggests every Frame Flyback i.e., 50 Hz in the UK, 60 Hz in various other countries. The Fast Ticker interrupts occur at 300 Hz and so 6 — or 5 if Flyback is at 60 Hz — of these will happen during the period between frame flybacks, unfortunately only three of these happen during the actual display period. The Fast Ticker is used to set the position at which the screen is split and the Frame Flyback used to synchronise the split position with the display.

To use the interrupt queues each routine to be called has to have an event block which is an area of memory reserved by the user which is kicked by the interrupt and in turn calls the routine. These blocks are initialised, put on the queues, deleted from the queues, etc using various jump blocks. ■

Basic loader.

```
5  REM version 1.1
10  REM Basic loader for SPLIT.
20  REM keep the line numbers as listed
30  REM  and then when you make a mistake
40  REM  in the data statements the
50  REM  program will tell you what line
60  REM  it is in.
65 PRINT "To load the code from 34000 onwards":PRINT "
press Enter when the INPUT  prompts appear"
70  INPUT"Start of Machine code program";startp
80  IF startp = 0 THEN startp = 34000
90  IF startp < 0 THEN startp = startp + 65536
100 INPUT"Start of Variable Area";startd
110 IF startd = 0 THEN startd = 34329
120 IF startd < 0 THEN startd = startd + 65536
130 IF startd-INT ( startd / 256 ) * 256 <> 25 THEN GO
TO 100
140 IF startd<startp AND startd < HIMEM THEN MEMORY st
artd-1 ELSE IF startp<startd AND startp<HIMEM THEN MEM
ORY startp-1
150 address = startp
160 limit = startp + 329
170 datastart = 1000
180 GOSUB 800
190 address = startd
200 limit = startd + 157
210 datastart = 2000
220 GOSUB 800
230 address = startd + 231
240 limit = startd + 240
250 datastart = 3000
260 GOSUB 800
270 FOR n= 1 TO 37
280     READ address : READ value
290     address = address + 31536 + startp : value = va
lue + startd
300     GOSUB 600
310 NEXT
320 FOR n= 1 TO 10
330     READ address: READ value
340     address = address + 31536 + startp : value = va
lue + startp
350     GOSUB 600
360 NEXT
370 FOR n = 1 TO 4
380     READ address : READ value
390     address = address - 34619 + startd : value = va
lue + startp
400     GOSUB 600
410 NEXT
420 CALL startp
430 |SPLIT,1
440 STOP
600 REM poke in new address values
610 POKE address,value-INT( value/256 ) * 256
620 POKE address + 1, INT( value/256 )
630 RETURN
800 REM read data subroutine
810 startaddrs = address
820 check = 0
830 FOR n= 0 TO 7
840 READ v:POKE address+n,v
850 check = check + v
860 NEXT
870 READ checksum
880 IF check <> checksum THEN GOTO 940
890 address = address + 8
900 IF address < limit THEN GOTO 820
910 RETURN
920 REM save m/c version
930 SAVE"split.exe",b,34000,585
940 REM check sum error
950 linenumber = INT(( address - startaddrs )/8 ) * 10
 + datastart
960 PRINT" data error in line ";
970 PRINT linenumber
980 STOP
990 REM program data
1000 DATA 1,142,134,33,01,134,205,209,&03A0
1010 DATA 180,201,254,0,32,12,62,4,&02F1
1020 DATA 50,59,134,62,46,50,60,134,&0253
1030 DATA 24,52,254,1,202,4,133,254,&039C
1040 DATA 3,194,251,133,221,126,0,254,&049D
1050 DATA 17,56,2,62,16,50,58,134,&0188
1060 DATA 221,35,221,35,221,126,0,198,&0421
1070 DATA 3,230,7,95,214,3,1,52,&035D
1080 DATA 134,129,79,32,1,4,10,50,&0187
1090 DATA 60,134,123,50,59,134,33,71,&0298
1100 DATA 134,6,129,14,255,17,160,133,&0350
1110 DATA 205,215,188,33,61,134,6,193,&0400
1120 DATA 14,255,17,57,133,205,224,188,&0445
1130 DATA 201,58,57,134,33,59,134,198,&0362
1140 DATA 40,77,58,60,134,71,16,254,&02CE
1150 DATA 6,127,58,58,134,254,2,56,&0287
1160 DATA 33,33,0,135,245,85,94,58,&02A0
1170 DATA 16,175,14,16,35,229,102,237,&0318
1180 DATA 81,237,89,237,73,237,121,237,&0520
1190 DATA 105,237,97,225,35,241,40,31,&03F3
1200 DATA 24,20,46,16,237,105,58,16,&020A
1210 DATA 175,237,121,33,0,135,58,58,&0309
1220 DATA 134,254,0,40,10,61,237,105,&0349
1230 DATA 237,163,4,189,210,134,133,58,&0468
1240 DATA 57,134,61,33,2,62,6,50,&0194
1250 DATA 57,134,62,0,50,65,134,201,&029F
1260 DATA 205,59,188,205,56,188,62,6,&03C9
1270 DATA 50,57,134,62,0,50,75,134,&0232
1280 DATA 201,33,61,134,205,230,188,33,&043D
1290 DATA 71,134,205,221,188,201,254,2,&04FC
1300 DATA 32,57,221,126,2,33,0,135,&025E
1310 DATA 254,16,48,56,6,0,79,9,&01D4
1320 DATA 221,126,0,254,29,210,4,134,&03D1
1330 DATA 17,25,134,131,95,48,1,20,&0187
1340 DATA 26,119,201,254,1,194,251,133,&0498
1350 DATA 123,254,28,210,4,134,17,25,&031F
1360 DATA 134,131,95,48,1,20,26,50,&01F9
1370 DATA 16,135,201,33,85,134,6,28,&027E
1380 DATA 205,17,134,201,33,113,134,6,&0347
1390 DATA 29,205,17,134,201,126,35,197,&03AC
1400 DATA 229,205,93,187,225,193,16,245,&0571
1410 DATA 201,0,0,0,0,0,0,0,&00C9
1990 REM  variables and tables data
2000 DATA 84,68,85,92,88,93,76,69,&02A8
2010 DATA 77,86,70,87,94,64,95,78,&0288
2020 DATA 71,79,83,66,83,90,89,91,&0288
2030 DATA 74,67,75,110,46,110,46,237,&02FD
2040 DATA 6,6,2,69,0,0,0,0,&0055
2050 DATA 0,0,0,0,0,0,0,0,&0000
2060 DATA 0,0,0,0,0,0,0,0,&0000
2070 DATA 0,0,0,0,80,65,82,65,&0124
2080 DATA 77,69,84,69,82,32,67,79,&022F
2090 DATA 85,78,84,32,69,82,82,79,&024F
2100 DATA 82,32,73,78,32,82,83,88,&0226
2110 DATA 80,65,82,65,77,69,84,69,&024F
2120 DATA 82,32,79,85,84,32,79,70,&021F
2130 DATA 32,82,65,78,71,69,32,77,&01F6
2140 DATA 70,32,82,83,88,156,134,195,&0358
2150 DATA 218,132,195,177,133,195,198,133,&0550
2160 DATA 195,227,133,83,80,76,73,212,&0437
2170 DATA 83,80,76,73,84,79,70,198,&0287
2180 DATA 76,79,73,78,203,76,79,66,&02D6
2190 DATA 79,82,68,69,210,0,0,0,&01FC
2990 REM RSX routine address data
3000 DATA 74,68,76,87,64,66,68,70,&0229
3010 DATA 74,68,76,87,72,74,76,77,&0258
3020 DATA 74,0,0,0,0,0,0,0,&004A
3990 REM absolute address data
4000 DATA &04D1,117,&04D9, 56,&04E1, 24
4010 DATA &04E6, 35,&04F2, 33,&050F, 27
4020 DATA &0518, 35,&051C, 34,&051F, 46
4030 DATA &052C, 56,&053A, 33,&053D, 34
4040 DATA &0543, 35,&054B, 33,&0552,231
4050 DATA &0558,247,&0577,247,&057C,231
4060 DATA &057F, 33,&04AE,131,&0590, 32
4070 DATA &0598, 32,&0598, 40,&05A9, 32
4080 DATA &05AE, 58,&05B2, 36,&05B8, 46
4090 DATA &05C6,231,&05D9,  0,&05EF,  0
4100 DATA &05FB,247,&05FF, 60,&06A5, 88
4120 DATA &04ED, 52,&04F2,299,&052A,200
4130 DATA &0533,185,&0556,300,&05E6,299
4140 DATA &05EC,309,&0601,317,&060A,317
4150 DATA &0580,192
4200 DATA &0A57,228,&0A46,275,&0AF1, 10
4210 DATA &0A94,225
10000 |SPLIT,1,6
```

```
        CP L                    ; Check if this is the last ink to be set
        JP NC,FTOUT             ; If not continue outputing
;
;
FTPASS: LD A,(PCOUNT)           ; Get the position counter
        DEC A                   ; And decrement it
        JR NZ, FTNST            ; If it decrements to zero
        LD A,6                  ; Reset it to 6
FTNST:  LD (PCOUNT),A           ; And store it again
        LD A,0                  ; Reset the Fast Ticker block counter
        LD (FTBLK+4),A          ;
        RET                     ; Return to basic

;                       FRAME FLYBACK ROUTINE
;                       ---------------------
;
; This routine is called every 20 mS. It Synchronises the Split position with
; the Frame Flyback. It also resets the palliette at the frame top
;
FFRTN:  CALL &BC3B              ; Get border colour
        CALL &BC38              ; Set border colour
        LD A,6                  ; Reset position counter
        LD (PCOUNT),A           ;
        LD A,0                  ; Reset the Frame FlyBack block counter
        LD (FFBLK+4),A          ;
        RET                     ; Return to basic

;                       SPLITOFF COMMAND ROUTINE
;                       ------------------------
;
; This routine is called when the RSX command SPLITOFF is  found. It resets the
; screen to the normal format.  The Fast Ticker and Frame Flyback Blocks are
; removed from their respective queues.
;
OFF:
        LD HL,FTBLK             ; Remove fast ticker block
        CALL &BCE6              ; HL DEL FAST TICKER
        LD HL,FFBLK             ; Remove Frame Flyback block
        CALL &BCDD              ; HL DEL FRAME FLY
        RET                     ; Return to basic

;                       LOINK COMMAND ROUTINE
;                       ---------------------
;
; This routine is called when the RSX command LOINK,n,m is found. It changes the
; colour associated with ink number 'n' to colour 'm'. It requires two
; parameters, and if the correct number of parameters are not passed then it
; exits via the error routine.
;
LOINK:  CP 2                    ; Check for two parameters
        JR NZ,PCERR             ;
        LD A,(IX+2)             ; Get the Ink number

        LD HL,INKTAB            ; Get the Ink table start
        CP 16                   ; Check that the ink number is
        JR NC,PRERR             ;  in range 0 - 15
        LD B,0                  ;
        LD C,A                  ;
        ADD HL,BC               ; Add offset in table
        LD A,(IX)               ; Get the Ink colour
        CP 28                   ; Check if it is in range
        JP NC,PRERR             ;
        LD DE,COLTABL           ; Get the start of the Hardware colour table
        ADD A,E                 ; Add the colour offset ( ADD DE,A )
        LD E,A                  ;
        JR NC,LO1               ;
        INC D                   ;
LO1:    LD A,(DE)               ; Get Hardware colour number
        LD (HL),A               ; Load into ink table
LOEND:  RET                     ; Return to basic

;                       BORDER COLOUR COMMAND ROUTINE
;                       -----------------------------
;
; This routine is called when the RSX command LOBORDER,m is found. It changes
; the colour of the lower border area to colour 'm'. It requires one parameter,
; and if more or less than one parameter is past then it exits via the Error
; routine.
;
BORDER:
        CP 1                    ; Check there is only one Parameter
        JP NZ,PCERR             ; If not jump to error
        LD A,E                  ; Get the Low Byte of the parameter
        CP 28                   ; Check that the colour is in range
        JP NC,PRERR             ;
        LD DE,COLTABL           ; Get the start of the colour lookup table
        ADD A,E                 ; And add the parameter as an offset
        LD E,A                  ;   ( ADD DE,A )
        JR NC,BO1               ;
        INC D                   ;
BO1:    LD A,(DE)               ; Get Hardware colour number from the table
        LD (BORCOL),A           ; Load into ink colour into varible
        RET                     ; Return to Basic

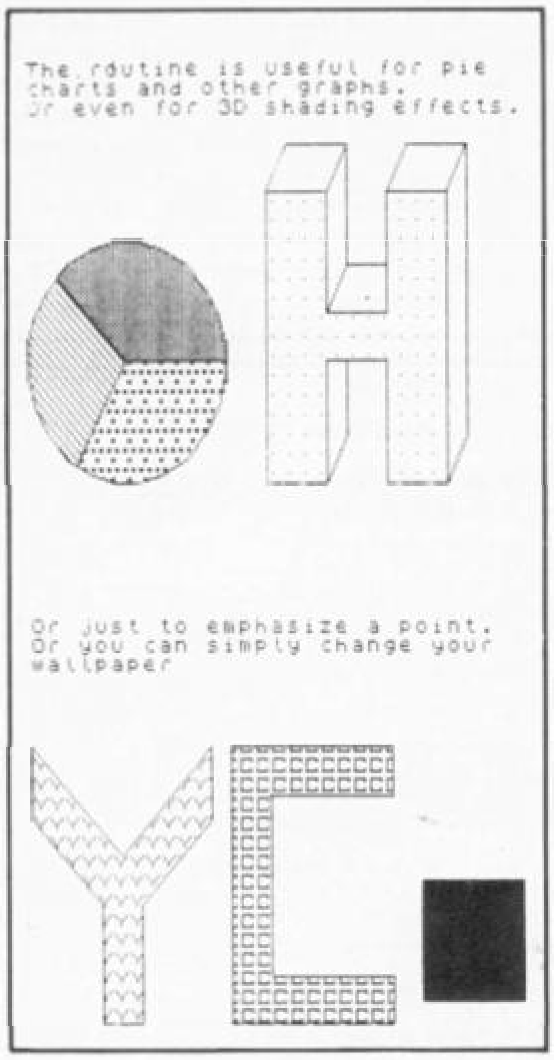
;                       PARAMETER COUNT ERROR ROUTINE
;                       -----------------------------
;
; This routine is entered if the parameter count was incorrect.
;
;
PCERR:  LD HL,PCMES             ; Point HL at the start of message
        LD B,28                 ; Load B with its length
        CALL PRINTMES           ; Call message printing routine
        RET                     ; ( uses the current window )

;                       PARAMETER RANGE ERROR ROUTINE
;                       -----------------------------
;
; This routine is entered if the parameter was out of range.
;
;
PRERR:  LD HL,PRMES             ; Point HL at the start of message
        LD B,29                 ; Load B with its length
        CALL PRINTMES           ; Call message printing routine
                                ; ( uses the current window )
;
EXIT:   RET                     ; Return to Basic

;                       PRINT MESSAGE SUBROUTINE
;                       ------------------------
;
; This routine should be entered with the address of the start of the string
; in HL and the Length of it in B. It prints the string, printing not obeying
; control codes in the current window.
;
PRINTMES:
        LD A,(HL)               ; Get a character
        INC HL                  ; Point at the next
        PUSH BC                 ; Save counter
        PUSH HL                 ; Save pointer
        CALL &BB5D              ; TXT WR CHAR
        POP HL                  ; Recover pointer
        POP BC                  ; Recover counter
        DJNZ PRINTMES           ; Are there any more to print
        RET
```

Listing 2.

```
    1 DEF FN i(h$)=CODE h$-48-7*(h
$>"9")
    2 DEF FN h(b$)=16*FN i(b$(1))+
FN i(b$(2))
    3 RESTORE 100
    4 LET LI=110
    5 READ ADD
    6 LET C=0: READ A$,CH
    7 IF a$(1)="Z" THEN PRINT "POK
ING COMPLETE. SAVE CODE NOW!": GO
 TO 20000
    8 IF LEN A$<>16 THEN PRINT "LI
NE LENGHT WRONG:";LI: STOP
    9 FOR K=0 TO 7
   10 LET B$=A$( TO 2)
   11 LET A$=A$(3 TO )
   12 LET B=FN H(B$)
   13 POKE ADD,B
   14 LET C=C+PEEK ADD
   15 LET ADD=ADD+1
   16 NEXT K
   17 IF C<>CH THEN PRINT "CHECKSU
M ERROR:";LI: STOP
   18 GO TO 6
   97 REM ***********************
        * PLACE START ADDRESS *
        * AT LINE 100 FOLLOWED*
        * BY DATA ENDING WITH *
        * DATA "Z",0          *
       ***********************
  100 DATA 64800
  110 DATA "F3C3CAFD03E500C5",1322
  120 DATA "3EAF9030043E01C1",689
  130 DATA "C9E5CDCE22CDA22D",1287
  140 DATA "E179C1C9C53EAF90",1318
  150 DATA "30043E00C1C94759",668
  160 DATA "480600CB21CB10CB",736
  170 DATA "21CB10CB21CB10CB",910
  180 DATA "21CB10CB21CB107B",830
  190 DATA "CB3BCB3BCB3B1600",808
  200 DATA "2A24FD1909CB23CB",806
  210 DATA "23CB23C17993C601",933
  220 DATA "C9477ECB2710FC38",964
  230 DATA "033E00C93E01C947",601
  240 DATA "3E00371F10FDB677",718
  250 DATA "C9C5E5D5CD3CFDFE",1612
  260 DATA "002004D1E1C1C9CD",1069
```



HAT

THESE TWO machine-code routines provide your 48K Spectrum with a way of filling in the screen without all the problems of attributes, i.e. colours overlapping. This is achieved by filling in the required area with a set pixel pattern, set up by the user in the first user-defined graphic.

The main dollop of machine code is in fact a common garden fill routine, this particular one by N. Dore — *Your Computer* October 1983. The program first fills in the required area in the usual way, then hatches it.

To type in the machine code, first type in listing 1. Type Run and the computer will check the data for any errors. After correcting any of these errors, save the program to tape or Microdrive with:

SAVE "HATCH DATA"

or

SAVE *"m";1;"HATCH DATA"

Now save the code with

SAVE "HATCH" CODE 58000,70

or

SAVE *"m";1;"HATCH" CODE 58000,70

It is probably best to save the code on a different tape from the data programs. Next comes the fill routine. Type

CLEAR 57999

then type in listing 2 and Run it, correcting any errors. Then save it with

SAVE "FILL DATA"

or

SAVE *"m";1;"FILL DATA"

The reason for saving the data programs as well as the code is that checksums do not detect all errors. Now save the actual code using

SAVE "FILL" CODE 64800,500

or

SAVE *"m";1;"FILL" CODE 64800,500

Now the code is ready to run. Listing 3 demonstrates some of the possibilities of this routine. How to use this routine is probably best learned by studying this program but here is an example of step by step hatching.

1. Create shape to be filled on screen, making sure there are no gaps along the edges.

2. Define the first UDG (see listing 4 or manual).

3. Choose any point inside the shape and type

PLOT INVERSE 1;x,y

where x,y is the chosen point.

4. Type

RANDOMIZE USR 64800

and the area will fill with ink.

5. Type

RANDOMIZE USR 58000

and the area filled will become hatched.

6. If you don't like the pattern, then type

RANDOMIZE USR 58000

redefine the UDG and retype

RANDOMIZE USR 58000

Listing 1.

```
    1 DEF FN i(h$)=CODE h$-48-7*(h
$>"9")
    2 DEF FN h(b$)=16*FN i(b$(1))+
FN i(b$(2))
    3 RESTORE 100
    4 LET LI=110
    5 READ ADD
    6 LET C=0: READ A$,CH
    7 IF a$(1)="Z" THEN PRINT "POK
ING COMPLETE. SAVE CODE NOW!": GO
 TO 20000
    8 IF LEN A$<>16 THEN PRINT "LI
NE LENGHT WRONG:";LI: STOP
    9 FOR K=0 TO 7
   10 LET B$=A$( TO 2)
   11 LET A$=A$(3 TO )
   12 LET B=FN H(B$)
   13 POKE ADD,B
   14 LET C=C+PEEK ADD
   15 LET ADD=ADD+1
   16 NEXT K
   17 IF C<>CH THEN PRINT "CHECKSU
M ERROR:";LI: STOP
   18 GO TO 6
   97 REM ***********************
        * PLACE START ADDRESS *
        * AT LINE 100 FOLLOWED*
        * BY DATA ENDING WITH *
        * DATA "Z",0          *
       ***********************
  100 DATA 58000
  110 DATA "06AF1103E52A7B5C",687
  120 DATA "78E607EE07C54F06",884
  130 DATA "0009C1CDA8E210ED",1054
  140 DATA "0E00CD85E21379C6",964
  150 DATA "004F30F6C9D5E5C5",1221
  160 DATA "E5CDAA221A46A8E1",1127
  170 DATA "4F7E471AA08157C1",919
  180 DATA "C5CDAA2272C1E1D1",1347
  190 DATA "C900000000000000",201
  200 DATA "Z",0
```

```
270 DATA "79FDD1E1C1C9C5E5",1628
280 DATA "D5CD3CFDFE002004",1021
290 DATA "D1E1C1C9CD87FDD1",1630
300 DATA "E1C1C9C5F53EAF90",1442
310 DATA "3805E5CDDF22E1F1",1218
320 DATA "C1C92A24FD010016",748
330 DATA "3600230B78B1FE00",651
340 DATA "20F62A7D5CE5444D",911
350 DATA "0CCD27FDFE00200A",805
360 DATA "CDBBFDCDA6FD18F0",1533
370 DATA "0000E1444D0DCD27",627
380 DATA "FDFE002008CDBBFD",1192
390 DATA "CDA6FD18F03E0032",1000
400 DATA "815C2A24FD0100AF",728
410 DATA "7EFE00C479FE2379",1107
420 DATA "C608FE002001054F",577
430 DATA "3EFFB8287A18E9CD",1125
440 DATA "91FDFE00C804CD27",1100
450 DATA "FDFE00CC8DFE050C",1123
460 DATA "CD27FDFE00CC8DFE",1350
470 DATA "0D05CD27FDFE00CC",973
480 DATA "8DFE040DCD27FDFE",1163
490 DATA "00CC8DFE0CC9E511",1058
500 DATA "2000237ECB7FE1C8",948
510 DATA "E52B7ECB47E1C8E5",1326
520 DATA "197EFEFFE1C0E5A7",1473
530 DATA "ED527EFEFFE1C0D1",1580
540 DATA "C9CD56FEC51E00D5",1186
550 DATA "CD27FED10C1C3E08",817
560 DATA "BB20F4C1C9CD91FD",1460
570 DATA "FE01C8CDA6FDCDBB",1471
580 DATA "FD3E0132815CC93A",846
590 DATA "815CFE00CAECFE3E",1229
600 DATA "0032815C2A24FD11",619
610 DATA "FF151901FF007EFE",937
620 DATA "00C4CDFE2B79D608",1041
630 DATA "FEFF2001044F3EB0",863
640 DATA "B8281618E9CD56FE",1048
650 DATA "C51E00D5CD27FED1",1147
660 DATA "0D1C3E08BB20F4C1",767
670 DATA "C93A815CFE00CAEC",1172
680 DATA "FEC305FE2A24FD11",1056
690 DATA "00000100167EC506",352
700 DATA "08CB2730011310F9",583
710 DATA "C10B2378B1FE0020",822
720 DATA "EC424BFBC9000000",829
730 DATA "0000000000000000",0
740 DATA "Z",0
```

TCHED FILL

A J Renton makes it easy to fill the Spectrum screen with patterns.

7. If you wish to remove all of the filled area, using

RANDOMIZE USR 58000

revert the hatch pattern to its original all filled in position, define the UDG as totally blank and type

RANDOMIZE USR 58000

Hey presto! the filled area disappears.

A final warning: before loading the fill routine, always type

CLEAR 57999

or the computer is likely to crash.

Listing 4.

```
10 REM UDG data poke
program
20
30 RESTORE 100
40 FOR k=USR "a" TO
USR "a"+7
50 READ byte
60 POKE k,byte
70 NEXT k
80 PRINT "A": REM Gr
aphics A
100 DATA BIN 10001000
101 DATA BIN 01000100
102 DATA BIN 00100010
103 DATA BIN 00010001
104 DATA BIN 10001000
105 DATA BIN 01000100
106 DATA BIN 00100010
107 DATA BIN 00010001
```

Listing 3.

```
10 REM Hatch demo
15
20 REM bv A.Renton 1985
25
30 LET poke=9000
40 LET fill=64800
50 LET hatch=58000
60 PAPER 7: INK 0: BRIGHT 0: FLASH 0:
OVER 0: INVERSE 0: CLS
70 BORDER 7
80 PRINT "The routine is useful for pi
e   charts and other graphs."
90 CIRCLE 50,50,50
100 PLOT 50,50: DRAW 50,0
110 PLOT 50,50: DRAW -35,35
120 PLOT 50,50: DRAW -25,-43
130 PLOT INVERSE 1:60,60: RANDOMIZE USR
fill
140 DATA 170,85,170,85,170,85,170,85: G
O SUB poke
150 RANDOMIZE USR hatch
160 PLOT INVERSE 1;40,40: RANDOMIZE USR
fill
170 DATA BIN 10001000,BIN 1000100,BIN 1
00010,BIN 10001,BIN 10001000,BIN 1000100
,BIN 100010,BIN 10001: GO SUB poke
180 RANDOMIZE USR hatch
190 PLOT INVERSE 1;60,40: RANDOMIZE USR
fill
200 DATA BIN 0,BIN 01100110,BIN 0110011
0,BIN 0,BIN 0,BIN 11000,BIN 11000,BIN 0
210 GO SUB poke: RANDOMIZE USR hatch
220 PRINT "Or even for 3D shading effec
ts."
230 PLOT 150,0: DRAW 0,50: DRAW 30,0: D
RAW 0,-50: DRAW 30,0: DRAW 0,120: DRAW -
30,0: DRAW 0,-50: DRAW -30,0: DRAW 0,50:
DRAW -30,0: DRAW 0,-120: DRAW 30,0
240 DRAW 10,20: DRAW 0,20: DRAW 0,10
250 PLOT 150,70: DRAW 10,20: DRAW 20,0:
PLOT 160,90: DRAW 0,50: DRAW -30,0: DRA
W -10,-20: DRAW 30,0: DRAW 10,20
260 PLOT 210,0: DRAW 10,20: DRAW 0,120:
DRAW -10,-20: DRAW -30,0: DRAW 10,20: D
RAW 30,0
270 PLOT INVERSE 1;131,1: RANDOMIZE USR
fill
280 DATA 0,0,0,16,0,0,0,0: GO SUB poke:
RANDOMIZE USR hatch
290 PLOT INVERSE 1;130,122: RANDOMIZE U
SR fill
300 DATA 0,255,0,255,0,255,0,255
310 GO SUB poke: RANDOMIZE USR hatch
320 PLOT INVERSE 1;190,122: RANDOMIZE U
SR fill: RANDOMIZE USR hatch
325 PLOT INVERSE 1;160,80: RANDOMIZE US
R fill: RANDOMIZE USR hatch
330 PLOT INVERSE 1;152,20: RANDOMIZE US
R fill
340 DATA BIN 11011101,BIN 11101110,BIN
1110111,BIN 10111011,BIN 11011101,BIN 11
101110,BIN 1110111,BIN 10111011
350 GO SUB poke: RANDOMIZE USR hatch
360 PLOT INVERSE 1,212,20: RANDOMIZE US
R fill: RANDOMIZE USR hatch
370 PLOT INVERSE 1;152,90: RANDOMIZE US
R fill: RANDOMIZE USR hatch
380 PAUSE 20: PAPER 0: INK 6: BRIGHT 1:
CLS
390 PRINT "Or just to emphasize a point
."
400 PLOT 35,0: DRAW 0,50: DRAW -35,35:
DRAW 0,30: DRAW 45,-45: DRAW 45,45: DRAW
0,-30: DRAW -35,-35: DRAW 0,-50: DRAW -
20,0
410 PLOT INVERSE 1;40,1: RANDOMIZE USR
fill
420 DATA 0,BIN 1000001,BIN 100010,BIN 1
0100,BIN 1000,BIN 1000,0,0
430 GO SUB poke: RANDOMIZE USR hatch
440 PLOT 100,0: DRAW 0,115: DRAW 80,0:
DRAW 0,-20: DRAW -60,0: DRAW 0,-75: DRAW
60,0: DRAW 0,-20: DRAW -80,0
450 PLOT 179,1: INK 4: RANDOMIZE USR fi
ll
460 DATA 0,126,66,64,64,66,126,0
470 GO SUB poke: RANDOMIZE USR hatch
480 PRINT "Or you can simply change you
r   wallpaper"
490 PLOT 195,10: DRAW 50,0: DRAW 0,50:
DRAW -50,0: DRAW 0,-50
500 PLOT INVERSE 1;220,20: PAPER 5: INK
0: BRIGHT 1: RANDOMIZE USR fill
510 POKE 23676,62: FOR a=1 TO 26: POKE
23675,a*8: RANDOMIZE USR hatch: PAUSE 1:
RANDOMIZE USR hatch: IF CODE INKEY$ THE
N GO TO 520
515 NEXT a: GO TO 510
520 POKE 23676,255: POKE 23675,88
8999 STOP
9000 FOR k=USR "a" TO USR "a"+7: READ a:
POKE k,a: NEXT k
9010 RETURN
```

CBM-64 SPRITES

Nalin Sharma with a routine for special effects.



RASTER INTERRUPTS are one of the most important aspects of machine-code programming on the Commodore 64. They allow such things as smooth scrolling and split screen effects, both of which I have used in previous *Your Computer* programs.

However, one of the most striking illustrations of raster interrupts is to have more than eight sprites on the screen at once. This was hinted at in the programmers' reference guide, but there was no full explanation, and so here is a program which will display 64 sprites on your CBM-64.

The screen display of the CBM-64 is made up of 200 horizontal lines and is updated roughly every 1/60th of a second. The screen

Listing 1.

```
1 REM*******BASIC LOADER FOR 64 SPRITES********
2 REM*******COPYRIGHT 1985 NALIN SHARMA********
5 CM=34060:SM=5119:SUMCD=0:SPRCD=0
10 FORX=49152TO49445
20 READB:POKEX,B:SUMCD=SUMCD+B
30 NEXT
40 IF SUMCD<>CMTHENPRINT"DATA ERROR":STOP
50 FORX=8192TO8384
60 READA:POKEX,A:SPRCD=SPRCD+A
70 NEXT
80 IF SPRCD<>SMTHENPRINT"DATA ERROR":STOP
100 SYS49152
200 PRINT"■■"TAB(30)"■64 SPRITES"
210 PRINTTAB(30)"(C) NALIN"
220 PRINTTAB(30)"    SHARMA■"
1000 DATA 169, 147, 32, 210, 255, 32
1010 DATA 199, 192, 32, 12, 192, 96
1020 DATA 120, 169, 58, 141, 20, 3
1030 DATA 169, 192, 141, 21, 3, 169
1040 DATA 0, 141, 64, 3, 169, 1
1050 DATA 141, 26, 208, 173, 17, 208
1060 DATA 41, 127, 141, 17, 208, 169
1070 DATA 49, 141, 18, 208, 169, 255
1080 DATA 141, 25, 208, 169, 0, 141
1090 DATA 14, 220, 88, 96, 174, 64
1100 DATA 3, 160, 1, 189, 1, 193
1110 DATA 153, 0, 208, 200, 200, 192
1120 DATA 17, 208, 247, 169, 129, 141
1130 DATA 25, 208, 173, 17, 208, 41
1140 DATA 127, 141, 17, 208, 230, 64
1150 DATA 3, 174, 64, 3, 224, 9
1160 DATA 208, 5, 162, 0, 142, 64
1170 DATA 3, 189, 9, 193, 141, 18
1180 DATA 208, 224, 0, 208, 80, 238
1190 DATA 65, 3, 173, 65, 3, 201
1200 DATA 7, 208, 49, 169, 0, ;41
1210 DATA 65, 3, 238, 66, 3, 173
1220 DATA 66, 3, 41, 3, 141, 66
1230 DATA 3, 174, 66, 3, 189, 33
1240 DATA 193, 141, 248, 7, 141, 249
1250 DATA 7, 141, 250, 7, 141, 251
1260 DATA 7, 141, 252, 7, 141, 253
1270 DATA 7, 141, 254, 7, 141, 255
1280 DATA 7, 32, 175, 192, 76, 49
1290 DATA 234, 162, 0, 222, 0, 208
1300 DATA 222, 0, 208, 222, 0, 208
1310 DATA 232, 232, 224, 16, 208, 241
1320 DATA 96, 104, 168, 104, 170, 104
1330 DATA 64, 169, 255, 141, 21, 208
1340 DATA 169, 0, 141, 63, 3, 141
1350 DATA 66, 3, 141, 65, 3, 141
1360 DATA 16, 208, 162, 0, 160, 0
1370 DATA 189, 17, 193, 153, 0, 208
1380 DATA 169, 128, 157, 248, 7, 189
1390 DATA 25, 193, 157, 39, 208, 200
1400 DATA 200, 232, 224, 8, 208, 232
1410 DATA 169, 1, 141, 33, 208, 169
1420 DATA 6, 141, 32, 208, 96, 51
1430 DATA 75, 99, 123, 147, 171, 195
1440 DATA 219, 40, 71, 95, 119, 143
1450 DATA 167, 191, 215, 30, 60, 90
1460 DATA 120, 150, 180, 210, 240, 0
1470 DATA 2, 4, 5, 6, 11, 9
1480 DATA 14, 130, 129, 128, 129, 0
4000 DATA 0, 24, 0, 0, 60, 0
4010 DATA 0, 60, 0, 0, 24, 0
4020 DATA 2, 15, 128, 3, 31, 224
4030 DATA 1, 190, 48, 0, 254, 96
4040 DATA 0, 14, 64, 0, 14, 0
4050 DATA 0, 14, 0, 0, 29, 0
4060 DATA 0, 59, 128, 0, 97, 128
4070 DATA 0, 96, 192, 0, 192, 124
4080 DATA 0, 192, 4, 0, 64, 0
4090 DATA 0, 64, 0, 0, 192, 0
4100 DATA 0, 0, 0, 0, 0, 24
4110 DATA 0, 0, 60, 0, 0, 60
4120 DATA 0, 0, 24, 0, 0, 12
4130 DATA 0, 0, 31, 0, 0, 31
4140 DATA 128, 0, 62, 128, 1, 238
4150 DATA 128, 0, 207, 0, 0, 14
4160 DATA 0, 0, 30, 0, 0, 30
4170 DATA 0, 0, 30, 0, 0, 51
4180 DATA 0, 0, 49, 192, 0, 48
4190 DATA 32, 0, 16, 96, 0, 16
4200 DATA 0, 0, 32, 0, 0, 0
4210 DATA 0, 0, 0, 24, 0, 0
4220 DATA 60, 0, 0, 60, 0, 0
4230 DATA 24, 0, 0, 12, 0, 0
4240 DATA 30, 0, 0, 26, 0, 0
4250 DATA 26, 0, 0, 26, 0, 0
4260 DATA 26, 0, 0, 26, 0, 0
4270 DATA 22, 0, 0, 14, 0, 0
4280 DATA 30, 0, 0, 12, 0, 0
4290 DATA 12, 0, 0, 12, 0, 0
4300 DATA 12, 0, 0, 28, 0, 0
4310 DATA 12, 0, 0, 28, 0, 0
4320 DATA 0, 24, 0, 0, 60, 0
```

Listing 2.

```
  10 *=$C000 !MULTIPLEXED SPRITES COPYRIGHT 1985 NALIN SHARMA
  50 VIC         =  53248
  51 HRAST       =  VIC+17
  52 RAST        =  VIC+18
  53 IRST        =  VIC+25
  54 ERST        =  VIC+26
  55 XSCL        =  VIC+22
 880 VB          =  830
 890 HIND        =  VB+1                     !SPRITE MOVEMENT INDEX
 900 RASNUM      =  VB+2                     !INTERRUPT NUMBER
 905 SPD         =  VB+3                     !ANIMATION SPEED
 906 SPIND       =  VB+4                     !SPRITE NUMBER INDEX
 907 SPRITESON   =  VIC+21
 908 MSBX        =  VIC+16
 910 BORDER      =  53280
 915 BACKGR      =  53281
1000 !
1010 !
1020 !
1070 START       LDA #147
1080             JSR $FFD2                   !CLEAR SCREEN
1085             JSR SETSPRITES              !SET UP VIC CHIP
1090             JSR NEWINT                  ! SET NEW INTERRUPTS
1190             RTS                         !RETURN TO BASIC
1210 NEWINT      SEI
1220             LDA #<STINT                 !LOW BYTE INTERRUPT POINTER
1230             STA $0314
1232             LDA #>STINT                 !HIGH BYTE
1234             STA $0315
1250             LDA #0                      !NUMBER OF INTERRUPT
1260             STA RASNUM
1262             LDA #1                      !ALLOW INTERRUPTS TO BE CAUSED BY R
ASTER
1263             STA ERST
1264             LDA HRAST                   !HIGH BIT RASTER LINE
1265             AND #127
1266             STA HRAST
1267             LDA #49                     !LOW BYTE RASTER LINE
1268             STA RAST
1269             LDA #255
1270             STA IRST                    !CLEAR RASTER LATCH
1272             LDA #0
1274             STA 56334                   !CBM INTERRUPTS OFF
1277             CLI                         !READY TO BEGIN
```

(continued on opposite page)



is updated by an "invisible" horizontal line called a raster which runs from top to bottom of the video display.

So say, for example, you had all eight sprites at the top of the screen, you could interrupt the raster once it had drawn all eight sprites. Then you could change the Y position of all eight sprites to the bottom of the screen, so that when the raster reaches the bottom part of the screen it will draw all eight sprites again, thinking it hasn't drawn any sprites yet — see figure 1.

The process I have just described can be tightened up to interrupt at eight different parts of the screen, each time changing the Y position of the sprites — thereby giving 64 sprites.

Listing 1 is the Basic loader for the machine code program which shows 64 men running from right to left. Make sure you save the program before running it.

Listing 2 is the fully assembly listing of the program which is actually quite short. The complete program takes up less than 500 bytes, and that includes data for three sprites. Also, it shouldn't take much trouble to extend the program to a very simple Space Invaders program which shouldn't take up more than about 2K.

One last point is that since the program operates under interrupt control you have all the features of Basic at your disposal. It does make a very strange spectacle watching your program list upwards while 64 men are running across the screen. ■

Figure 1.



(listing 2 continued from opposite page)

```
1290             RTS
1300 !
1310 !
1320 !
1500 STINT       LDX RASNUM                  !START INTERRUPTS
1510             LDY #1
1520             LDA SPRITEVERT,X            !SPRITE-Y-POSITION
1530 PLACEY      STA VIC,Y
1532             INY
1534             INY
1540             CPY #17
1550             BNE PLACEY
1600             LDA #129
1610             STA IRST                    !CLEAR LATCH
1620             LDA HRAST
1630             AND #127
1640             STA HRAST
1641             INC RASNUM                  !SET UP FOR NEXT INTERRUPT
1642             LDX RASNUM
1644             CPX #8
1646             BNE NXLN
1647             LDX #0                      !RESET EVERY EIGTH INTERRUPT
1648             STX RASNUM
1650 NXLN        LDA RASLINE,X               !NEXT RASTER LINE
1660             STA RAST
1664             CPX #0
1670             BNE RETFROMINT
1680             INC SPD                     !DO ANIMATION OF ALL 64 MEN
1682             LDA SPD
1684             CMP #7
1686             BNE GOBACK
1690             LDA #0
1692             STA SPD
1700             INC SPIND
1704             LDA SPIND
1706             AND #3
1708             STA SPIND
1710             LDX SPIND
1740             LDA SPRPT,X
1750             STA 2040
1760             STA 2041
1770             STA 2042
1780             STA 2043
1790             STA 2044
1800             STA 2045
1810             STA 2046
1820             STA 2047
1822             JSR LEFT
1830 GOBACK      JMP $EA31                   !SERVICE CBM INTERRUPTS EVERY EIGTH
INTERRUPT
1870 LEFT        LDX #0
1872 LOOPLEFT    DEC VIC,X
1873             DEC VIC,X
1874             DEC VIC,X
1876             INX
1877             INX
1878             CPX #16
1879             BNE LOOPLEFT
1880             RTS
2070 RETFROMINT  PLA                         !PROCEDURE FOR RETURNING FROM THE O
THER 7 INTERRUPTS
2080             TAY
2090             PLA
2100             TAX
2110             PLA
2120             RTI
3000 !
3010 !
3020 !
5000 SETSPRITES  LDA #255
5010             STA SPRITESON
5020             LDA #0
5022             STA HIND
5024             STA SPIND                   !RESET SPEED & SPRITE INDEX OF MAN
5026             STA SPD
5030             STA MRAX
5040             LDX #0
5045             LDY #0
5050 PLACEX      LDA SPRITEHORZ,X
5060             STA VIC,Y                   !SPRITE-X-POSITION
5062             LDA #128
5064             STA 2040,X                  !SPRITE POINTERS
5066             LDA SPRITECOL,X
5068             STA 53287,X                 !SPRITE COLOURS
5070             INY
5080             INY
5090             INX
5100             CPX #8
5110             BNE PLACEX
5200             LDA #1
5210             STA BACKGR                  !WHITE SCREEN
5220             LDA #6
5230             STA BORDER                  !BLUE BORDER
5500             RTS
9000 SPRITEVERT  BYT 51,75,99,123,147,171,195,219
9010 RASLINE     BYT 40,71,95,119,143,167,191,215
9020 SPRITEHORZ  BYT 30,60,90,120,150,180,210,240
9030 SPRITECOL   BYT 0,2,4,5,6,11,9,14
9090 SPRPT       BYT 130,129,128,129
```

MACHINE



ONE OF THE features that most people miss when programming in machine code is strings. This program provides the machine-code programmer with a number of sub-routines to manipulate strings. It will then be possible to write educational programs, quizzes, etc. in machine-code with very little difficulty.

Up to 64 strings are available, numbered in hex from 00 to 3F. These are stored in the area of memory under the Basic Rom — $A000-$BFFF. The sub-routines are situated in memory between $C000 & $C300. They are in a form very similar to the kernal sub-routines and are used in the way way.

The new sub-routines are:

INPUT. Address $C1FA: This sub-routine receives information from the keyboard and stores it in the string specified by the accumulator. For example,

```
LDA #$09
JSR $C1FA
```

The information will be stored in string number 9.

PRINT. Address $C1FD: This sub-routine will display on the screen, at the current cursor position, the contents of the string specified by the accumulator. For example,

```
LDA #$05
JSR $C1FD
```

This will print string number 5.

CLEAR. Address $C200: This sub-routine will clear all characters from the string specified by the accumulator. For example,

```
LDA #$20
JSR $C200
```

This will clear string 32 (Hex 20).

CLEARALL. Address $C203: This clears all 64 strings and requires no registers to be set. This sub-routine should be called before using the strings to make sure that they are ready for use. For example,

```
JSR $C203
```

MEM→STRING. Address $C206: This sub-routine transfers information from the address specified in the X and Y registers to the string specified by the accumulator. The X register contains the least significant byte and the Y register the most significant byte. For example,

```
LDA #$01
LDX #$50
LDY #$80
JSR $C206
```

The above example transfers information from the address $8050 to string number 1. The first 125 bytes of information are transferred unless a 0 (Zero) is encountered which indicates the end of a string.

STRING→MEM. Address $C209: This performs the exact opposite function of the previous routine. This transfers the information in the string indicated by the accumulator to the address specified by the X and Y registers. The X register contains the LSB and the Y register the MSB. For example,

```
LDA #$01
LDX #$50
LDY #$80
JSR $C209
```

This. transfers the information in string number 1 to address S8050.

SWAP. Address $C20C: This sub-routine

```
0 REM *******************************
1 REM *RUN TO TRANSFER SUB'S TO MEM*
2 REM *                             *
3 REM *   RUN50000 TO CHECK DATA    *
4 REM *******************************
10 AD=49152
20 READA:IFA=-1THENEND
30 POKEAD,A:AD=AD+1:GOTO20
200 DATA72,169,0,133,251,169,160,133,252:REM 7663
201 DATA104,168,192,0,240,17,24,165,251:REM 6065
202 DATA105,128,133,251,165,252,105,0,133:REM 6033
203 DATA252,136,76,11,192,96,32,227,193:REM 6109
204 DATA32,0,192,160,0,32,207,255,201:REM 6738
205 DATA13,240,6,145,251,200,76,41,192:REM 6134
206 DATA169,0,145,251,169,13,32,210,255:REM 6730
207 DATA32,240,193,96,32,227,193,32,0:REM 4604
208 DATA192,169,54,133,1,160,0,177,251:REM 5864
209 DATA32,210,255,200,201,0,208,246,169:REM 7967
210 DATA55,133,1,32,240,193,96,32,227:REM 5781
211 DATA193,32,0,192,160,0,169,0,145:REM 4313
212 DATA251,200,192,127,208,249,32,240,193:REM 8150
213 DATA96,32,227,193,169,0,72,32,97:REM 4091
214 DATA192,104,168,200,152,201,64,208,244:REM 7978
215 DATA32,240,193,96,32,227,193,134,253:REM 7697
216 DATA132,254,32,0,192,160,0,177,253:REM 6349
217 DATA145,251,201,0,240,5,200,192,127:REM 6559
218 DATA208,243,32,240,193,96,32,227,193:REM 7068
219 DATA134,253,132,254,32,0,192,160,0:REM 4836
220 DATA169,54,133,1,177,251,145,253,201:REM 7919
221 DATA0,240,5,200,192,127,208,243,169:REM 7938
222 DATA55,133,1,32,240,193,96,32,227:REM 5781
223 DATA193,72,138,32,0,192,165,251,133:REM 6391
224 DATA253,165,252,133,254,104,32,0,192:REM 5717
225 DATA160,0,169,54,133,1,177,251,72:REM 5449
226 DATA177,253,145,251,104,145,253,200,192:REM 8611
227 DATA127,208,241,169,55,133,1,32,240:REM 5438
228 DATA193,96,32,227,193,72,138,32,0:REM 4008
229 DATA192,165,251,133,253,165,252,133,254:REM 9176
230 DATA104,32,0,192,169,54,133,1,160:REM 4484
```

CODE STRINGS

Graham Barbour helps you to write educational and quiz programs.

swaps two strings around. The first string is specified by the accumulator and the second by the register. For example,

```
LDA #$08
LDX #$05
JSR $C20C
```

String number 8 will now contain the information previous stored in string number 5 and vice versa.

COMPARE. Address $C20F: This sub-routine compares the string specified by the accumulator — we will call this A — with the string specified by the X register — we will call this B. The result of the comparison will be returned in the accumulator. The possible results are:

$FF this occurs if A is alphabetically less than B or if A and B are alphabetically the same but A is shorter than B.

$01 this occurs if A is alphabetically more than B or if A and B are alphabetically the same but A is longer than B.

$00 this occurs if the two strings are exactly the same. For example,

```
LDA # $01
LDX # $09
JSR $C20F
```

This compares strings 1 and 9. The result may now be used for a branch.

SORT. Address $C212: This sub-routine performs a bubble sort on all the strings from the string specified in the accumulator to the string specified by the X register. They are sorted into alphabetical order in a fraction of a second. For example,

```
LDA # $05
LDX # $3F
JSR $C212
```

This will sort strings 5 to 63 (Hex 3F) into alphabetical order.

SETNAM. Address $FFBD: This is a kernal sub-routine but is needed to define the file name for the next two routines which load and save strings. The accumulator must hold the length of the name. The X and Y registers must hold the address of where the name is stored in the usual way — the X register containing the least significant byte and the Y register the most significant byte. For example,

```
LDA # 05
LDX # 00
LDY # 80
JSR $FFBD
```

This will set a five character file name starting at address S8000.

SAVE. Address $C215: This routine saves strings to tape or disc, and must be used in conjunction with the Setnam routine. It saves from the string indicated in the accumulator up to and including the string in the X register. The Y register must contain the device number i.e. 8 for disc and 1 for tape. For example,

```
LDA # 10
LDX # 20
LDY # 08
JSR $C215
```

The above saves strings 16 to 32 — Hex 10 to 20 — onto disc.

LOAD. Address $C218: This routine loads strings and is used in conjunction with the Setnam routine. The Y register must contain the device number. For example,

```
LDY # 01
JSR $C218
```

This will load the previously saved strings from tape.

When these routines are called, the registers are not destroyed except where a value is returned e.g. Compare.

Program 1 is merely the loader program which transfers the sub-routines from Data lines to memory. If you have a machine-code monitor, you can save the actual sub-routine by saving from $C000 to $C250. The resulting program will be much shorter than program 1.

To enter program 1, type it leaving out the Rem statements and the numbers following them. Then, to test that all has been correctly entered, Run line 50000. Line 200 will appear followed by a number. Check that this number is the same as the number following the Rem statement for the corresponding line. If correct, press any key and the next line will appear. If incorrect, press Run Stop, list the suspect line and check it. Then Run 50000 again. ■

```
231 DATA0,177,251,209,253,240,22,144,10:REM 6044
232 DATA169,55,133,1,32,240,193,169,1:REM 4994
233 DATA96,169,55,133,1,32,240,193,169:REM 6073
234 DATA255,96,200,201,0,208,223,169,55:REM 6507
235 DATA133,1,32,240,193,169,0,96,0:REM 3938
236 DATA0,0,0,0,0,32,227,193,141:REM 4594
237 DATA67,193,142,68,193,169,0,141,72:REM 4906
238 DATA193,173,67,193,141,69,193,170,232:REM 7430
239 DATA32,254,192,201,1,240,13,174,69:REM 5469
240 DATA193,232,138,205,68,193,208,234,76:REM 7401
241 DATA131,193,173,69,193,170,232,32,205:REM 7022
242 DATA192,169,1,141,72,193,76,102,193:REM 5700
243 DATA173,72,193,201,1,240,200,32,240:REM 6961
244 DATA193,96,32,227,193,141,69,193,169:REM 6748
245 DATA54,133,1,232,142,71,193,152,170:REM 6484
246 DATA169,1,160,1,32,186,255,173,71:REM 5739
247 DATA193,32,0,192,165,251,141,67,193:REM 6616
248 DATA165,252,141,68,193,173,69,193,32:REM 5682
249 DATA0,192,169,251,174,67,193,172,68:REM 6506
250 DATA193,32,216,255,169,55,133,1,32:REM 4327
251 DATA240,193,96,32,227,193,152,170,169:REM 7280
252 DATA1,160,1,32,186,255,169,0,32:REM 4383
253 DATA213,255,32,240,193,96,141,237,193:REM 7940
254 DATA140,239,193,142,238,193,96,0,0:REM 4785
255 DATA0,173,237,193,172,239,193,174,238:REM 9008
256 DATA193,96,76,33,192,76,67,192,76:REM 4850
257 DATA97,192,76,118,192,76,139,192,76:REM 5790
258 DATA168,192,76,205,192,76,254,192,76:REM 7014
259 DATA73,193,76,142,193,76,206,193,0:REM 5662
260 DATA0,0,0,0,0,0,0,0,0:REM 0
270 DATA-1
50000 FL=200
50010 CO=1:AV=0:FORI=0TO8:READA:IFA=-1
      THENPRINT"■OK":END
50015 AV=AV+(CO*A):CO=CO+1:NEXT
50020 PRINT"■LINE";FL;"...";AV
50030 PRINT"■■PRESS"
50040 GETA$:IFA$=""THEN50040
50060 FL=FL+1:GOTO50010
```

IF YOU typed in last month's music editor, you will have produced data files of your favourite tunes, waiting to install them into the operating system of your BBC. Once installed two entry points are available from calling programs. An activation address will cause the tune to start playing, a call to the deactivation address will stop the tune after the sound buffer has processed at most two notes.

The most obvious application for this is to accompany games. The routine is very well behaved. As it is interrupt driven the tune will proceed without interference from the game program written in Basic or machine code.

Any memory locations used outside its own defined area are preserved across the period of time the tune system is active. This allows machine code programmers not to be concerned with page zero locations reserved for this routine.

As is usual with machine-code routines an area of memory will have to be declared for it and the machine code itself assembled for this area. The amount of memory needed for the routine will depend on the length of the tune. In general, the routine itself will need in the order of 300 bytes and each note will add two bytes to the length of the code.

Once the file produced by this system has been loaded into the machine it has to be protected. Any interference with the event vector in page two has to be legitimate. The int'tune system uses this vector correctly, finishing with a jump to the original destination after the routine has completed.

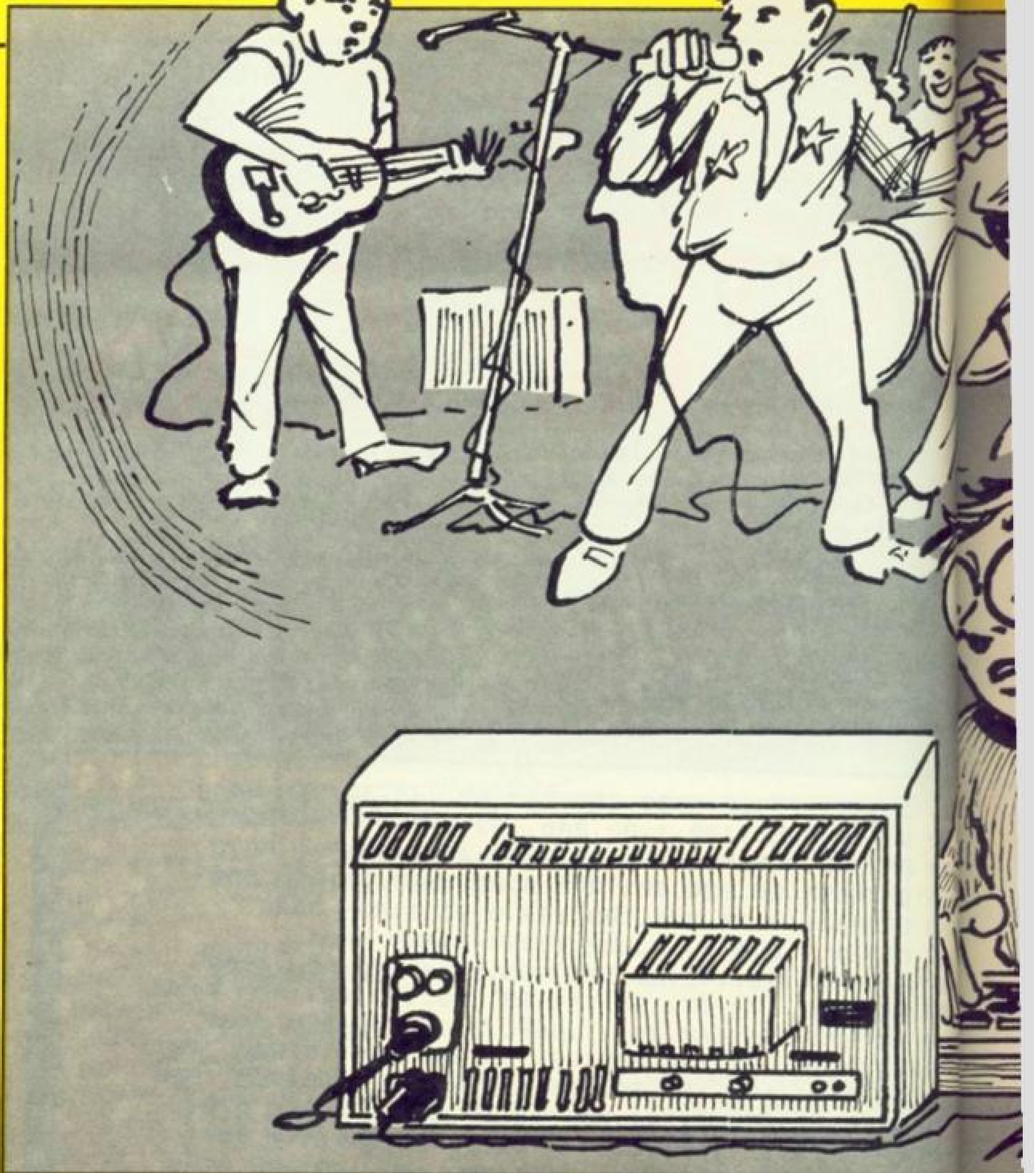
Any other routines chained onto the vectors should do the same else the int'tune system will be bypassed. Likewise, the contents of the registers should be preserved over any other use of the vector. In Basic and other systems the value of Page or other system variables should be moved to protect the code once it has been installed.

For example, with disc users where Page normally resides at address Hex 1900 and the tune system is two pages long, Page should be moved to Hex 1B00 before the tune is loaded and the code assembled from 1900 onwards.

Having decided on the address where the routine is to be installed and the data file is available, the program can be run to produce the interrupt driven routine. The system will require you to input the assembly address and the data file name. This is then followed by the sound and envelope number which the tune is to use.

The users' programs should avoid using the selected sound channel. The last input requested is the gap between the end of the tune and the restart of the tune. This is in intervals of 1/25th of a second, and should be in the range 1 to 255.

After these values have been confirmed the code will be assembled. This will require the data file to be read in, tape users should watch the



```
10 REM INT'TUNE2
20 REM FINTAN CULWIN
30 REM APRIL 1984
90 MODE 7
100 PROC_inputs
110 FOR opt = 0 TO 2 STEP 2
120 P% =location
130 PROC_interupt
140 PROC_checks
150 PROC_delay
160 PROC_main
170 NEXT opt
180 PROC_done
190 END
200 DEF PROC_inputs
210 REPEAT
220 OK = TRUE
230 CLS
240 FOR ytab=0 TO 1
250 PRINTTAB(12,ytab)CHR$(141);"INT'TUNE2"
260 PRINTTAB(12,ytab+2)CHR$(141);"#########"
270 NEXT ytab
280 PRINTTAB(2,6)"Assembly address"
290 PRINTTAB(2,8)"Input filename "
300 PRINTTAB(2,10)"Envelope number "
310 PRINTTAB(2,12)"Channel   number"
320 PRINTTAB(2,14)"Delay (0.04 s)"
330 INPUT TAB(21,6)location$
340 location = EVAL("&"+location$)
350 INPUT TAB(21,8) filename$
360 REPEAT
370 PRINTTAB(21,10)SPC(15);
380 INPUT TAB(21,10) envelope
390 IF envelope <0 OR envelope > 16 THEN PROC_wally
400 UNTIL envelope >-1 AND envelope < 17
410 REPEAT
420 PRINTTAB(21,12)SPC(15);
430 INPUT TAB(21,12) channel
440 IF channel <1 OR  channel >3 THEN PROC_wally
450 UNTIL channel >0 AND channel <4
460 INPUT TAB(21,14) deltarget
470 PRINTTAB(8,23)"CONFIRM (Y/N)";
480 REPEAT
490 response = GET AND 223
500 UNTIL response = 78 OR  response = 89
510 IF response = 78 THEN OK = FALSE
520 UNTIL OK
530 OSBYTE = &FFF4
540 OSWORD = &FFF1
550 DIM pitches(11),durations(7)
560 FOR pitch = 0 TO 11
570 READ pitches(pitch)
580 NEXT pitch
590 FOR duration = 0  TO 7
600 READ durations(duration)
610 NEXT duration
620 ENDPROC
700 DEF PROC_done
710 PRINTTAB(2,16)"Activation address";TAB(24,16);"a
ctivate
720 PRINTTAB(2,18)"Deactivation address";TAB(24,18);
"deactivate
730 PRINTTAB(2,20)"Highest location ";TAB(24,20);"to
p
740 PRINTTAB(8,23)SPC(18)'TAB(0,22)
750 CALL activate
760 ENDPROC
900 DEF PROC_wally
910 VDU7
920 *FX 15,0
930 PRINTTAB(8,22)CHR$(136);"OUT OF RANGE !!"
940 PRINT TAB(9,23)"PRESS ANY KEY.";
950 response=GET
960 PRINTTAB(2,22) SPC(20)'SPC(22);
970 ENDPROC
1000 DEF PROC_interupt
1010 [ OPT opt
1020 .activate
1030LDA &220            \
1040STA revec           \
1050LDA &221
1060STA revec+1         \ preserve original vector
1070LDA #(main MOD 256)
1080STA &220
1090LDA #(main DIV 256)
1100STA &221            \ install new vector
1110JSR reset           \ set to start of tune
1120JSR envdef          \ define envelope
1130LDA #&FF
1140STA flag            \ delay not active
1150LDA #&0E
1160LDX #4
1170JSR OSBYTE          \ *FX 14,4 enable interrupts
1180RTS                 \ from activation routine
1190.deactivate
1200LDA revec
1210STA &220
1220LDA revec+1
1230STA &221            \ restore original vector
1240RTS                 \ from deactivation routine
1250 ]
1260 ENDPROC
1500 DEF PROC_main
1510 [ OPT opt
1520 .main
1530 ]
1540 PROC_checks
1550 PROC_delay
1560 PROC_soundit
1570 PROC_utility
1580 PROC_data
1900 ENDPROC
2000 DEF PROC_checks
2010 [OPT opt
2020STA abuf+4          \ preserve A register
2030PHA
2040TXA
2050PHA
2060TYA
2070PHA                 \ stack registers
2080LDA &70
2090PHA
2100LDA &71
2110PHA                 \ stack page zero locations
2120LDA abuf+4
2130CMP #4
2140BNE exit            \ test A register for interr
upt #4
2150LDA flag
2160BNE no_delay        \ branch if delay not active
2170JMP delay           \ service delay
2180.no_delay
2190LDA #&80
2200LDX #(251 - channel)
2210JSR OSBYTE          \ examine chosen sound buffe
r
2220CPX #14
2230BCC exit            \ branch if sounds being pro
```



BEEBSKI BEAT

Fintan Culwin with the second part of his music program for the Beeb.

"cassette motor" led on the keyboard and start the tape with the data file when it lights up. When the code has been assembled it will demonstrate itself, and provide its activation, deactivation and high water addresses. A copy of the file can be saved with the command:

*SAVE filename assembly address highest point (activation address) <RETURN>

If the activation address is included in the command then the routine will self activate when it is loaded.

The routine uses the screen refresh event to time the system. When screen interrupts have been enabled, every 1/25th of a second the operating system jumps to the address contained in &220/1 with the accumulator containing the event code 4.

In order to install this system the contents of the vector have to be preserved and the address of the main part of the routine installed into the vector and screen refresh interrupts enabled. This is accomplished within the listing within PROC_install labelled activate.

In addition the envelope is defined with a call to a routine labelled envdef and the pointers set to the start of the tune with reset. The deactivation routine within the same procedure removes the sound driver by restoring the original vector. A tidier deactivation can be accomplished by disabling the interrupts with a

*FX 13,4

This may be a bad idea as other routines could be using these interrupts. Additionally the sound channel buffer could be cleared by using a

*FX 21

command.

The routine labelled main is pointed to by the new vector. It consists of three major parts. Setting up for interrupt, testing certain conditions and leaving the interrupt in an orderly manner. To set up for interrupt the A register is first preserved in Ram, then it, all other registers and two page zero locations are stacked.

The exit routine has to tidy the stack, restoring all values to the correct locations, and passing control to the address of the original vector. This is the only exit point from the routine.

The middle part first tests the Ram copy of the A register to determine if the interrupt was a screen refresh; with a fast exit if it isn't. A branch to the delay routine takes place if the delay is currently active, this is signalled by a flag. The state of the sound channel is then sampled.

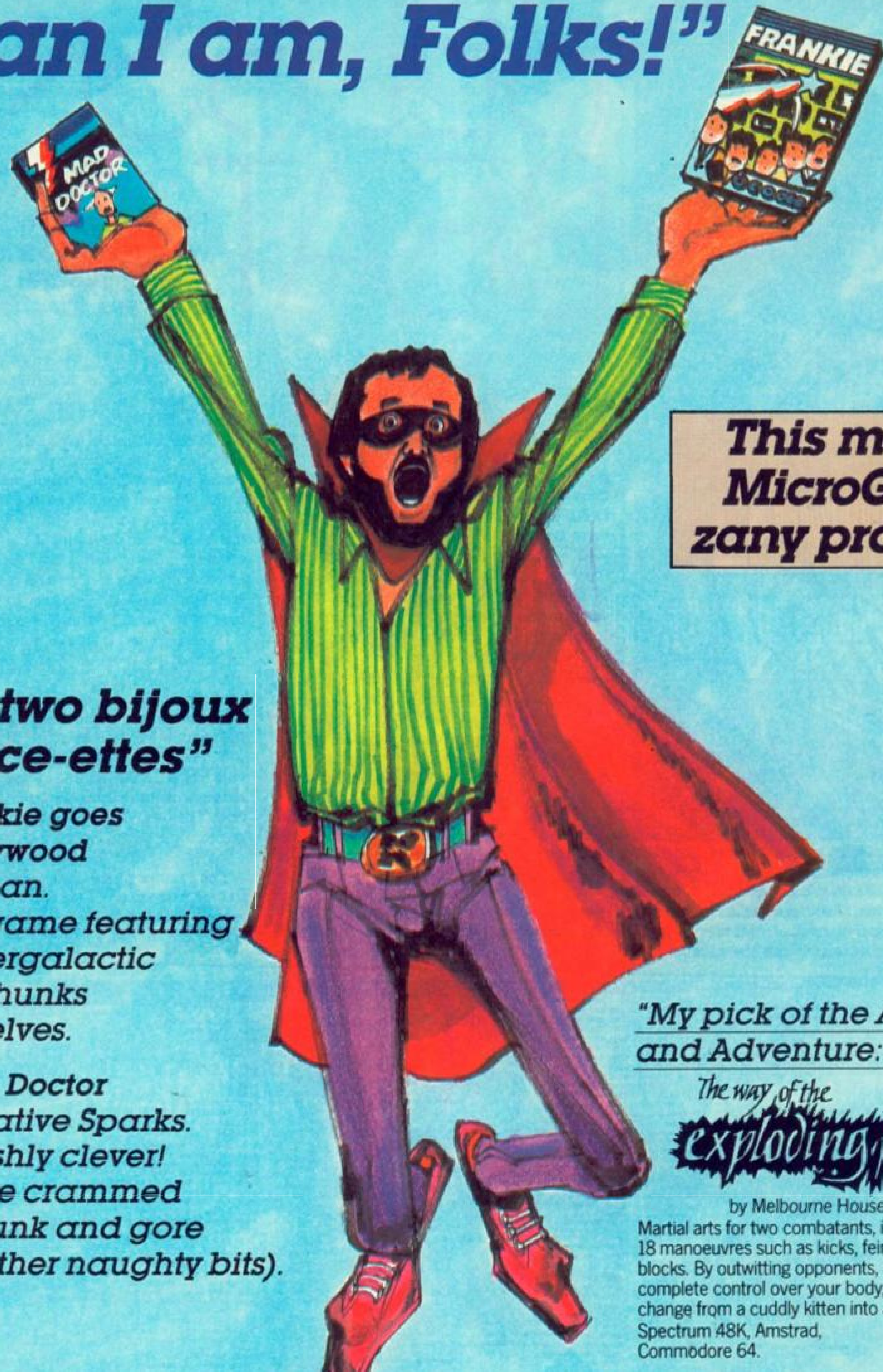
If there are less than two notes waiting to be processed the program jumps to the soundit routine to place another note in the buffer else the program exits.

In order to enter a note into the sound buffer the routine has to have some way of knowing which is the next note to be played. This is provided by a 16 bit location called counter. The contents of this location are transferred to page zero. The two values pointed to by this are then put into the sound buffer definition area, and a sound osword command executed.

The counter is then incremented by two and a check made to see if the end of tune has been reached. When the end of tune is met the counter is reset and the delay flag enabled. ■

```
[illegible]
2240JMP soundit          \ put one note in buffer
2250.exit
2260PLA
2270STA &71
2280PLA
2290STA &70              \ restore page zero locatio
ns
2300PLA
2310TAY
2320PLA
2330TAX
2340PLA                  \ restore registers
2350JMP (revec)          \ jump to original vector
2360 ]
2370 ENDPROC
2500 DEF PROC_delay
2510 [ OPT opt
2520 .delay
2530 INC delcount
2540 LDA delcount
2550 CMP deltarget
2560 BNE dundel          \ branch if delay NOT expir
ed
2570 LDA #&FF
2580 STA flag            \ change flag
2590JSR reset            \ point to start of tune
2600 .dundel
2610 JMP exit
2620 ]
2630 ENDPROC
3000 DEF PROC_soundit
3010 [ OPT opt
3020 .soundit
3030 LDA counter
3040 STA &70
3050 LDA counter+1
3060 STA &71             \ pointer to next note
3070 LDY #0
3080 LDA (&70),Y
3090 STA sbuf+4          \ move pitch to note buffe
r
3100 INY
3110 LDA (&70),Y
3120 STA sbuf+6          \ move duration to sound b
uffer
3130 LDA #7
3140 LDX #(sbuf MOD 256)
3150 LDY #(sbuf DIV 256)
3160 JSR OSWORD          \ sound command
3170 CLC
3180 LDA &70
3190 ADC #2
3200 STA counter
3210 LDA &71
3220 ADC #0
3230 STA counter+1       \ point to next note
3240 CMP #(top DIV 256)
3250 BNE notdun          \ test hi byte for end o
f tune
3260 LDA counter
3270 CMP #(top MOD 256)
3280 BNE notdun          \ test lo byte for end o
f tune
3290 JSR reset           \ point to start of tune
3300 LDA #0
3310 STA flag            \ enable delay routine
3320 STA delcount        \ zero delay counter
3330 .notdun
3340 JMP exit
3350 ]
3360 ENDPROC
3500 DEF PROC_utility
3510 [ OPT opt
3520 .reset
3530 LDA #(bottom MOD 256)
3540 STA counter
3550 LDA #(bottom DIV 256)
3560 STA counter+1
3570 RTS                 \ counter points to star
t of tune
3580 .envdef
3590 LDA #8
3600 LDX #(envbuf MOD 256)
3610 LDY #(envbuf DIV 256)
3620 JSR OSWORD
3630 RTS                 \ perform envelope comm
and
3640 ]
3650 ENDPROC
4000 DEF PROC_data
4010 IF opt > 2 THEN ENDPROC
4020 [ OPT opt
4030 .revec NOP : NOP
4040 .counter NOP : NOP
4050 .delcount NOP
4060 .flag NOP
4070 .envbuf
4080 ]
4090 P% = P%+14
4100 [ OPT opt
4110 .sbuf
4120 ]
4130 !sbuf = 0
4140 !(sbuf+4) = 0
4141 REM clear sound buffer
4150 sbuf?0 = channel
4160 sbuf?2 = envelope
4161 REM invariant
4170 P%=P%+8 : bottom = P%
4171 REM bottom points to start of tune
4180 chan = OPENIN(filename$)
4190 ?envbuf = envelope
4200 FOR parameter = 1 TO 13
4210 value = BGET #chan
4220 envbuf?parameter = value
4230 NEXT parameter
4231 REM first thirteen bytes define envelope
4240 REPEAT
4250 pitch = BGET #chan
4260 duration = BGET #chan
4270 P%?0 = pitches(pitch)
4280 P%?1 = durations(duration)
4281 REM translate from codes to values
4290 P%=P%+2
4300 UNTIL EOF #chan
4310 top = P%
4311 REM top shows end of tune
4320 ENDPROC
10000 DATA 101,109,117,121,129,137,145,149,157,165,169
,177
10001 REM pitch values
10010 DATA 5,7,10,15,20,30,40,60
10011 REM duration values
```

"These are even crazier than I am, Folks!"



This month's MicroGamer zany program

"My two bijoux choice-ettes"

***1.** Frankie goes to Hollywood by Ocean.*
A fab game featuring the intergalactic mega hunks themselves.

***2.** Mad Doctor by Creative Sparks.*
Fiendishly clever! A game crammed with gunk and gore (and other naughty bits).

"My pick of the Arcade and Adventure:"

The way of the exploding fist

by Melbourne House
Martial arts for two combatants, involving 18 manoeuvres such as kicks, feints, and blocks. By outwitting opponents, and gaining complete control over your body, you can change from a cuddly kitten into a Tenth Dan.
Spectrum 48K, Amstrad, Commodore 64. **£9.95**

THORN EMI Computer Software
International Micro Software Division

REPTON

by Superior Software

The object is to retrieve diamonds from an underground cave system, using maps and passwords. But look out! Ferocious reptiles are lurking just around the corner. (Yuk!)

BBC Electron. **£9.95**

GHETTO BLASTER

by Virgin

The player, alias Rockin' Rodney delivers demos to his record company. But first he must test their danceability by blasting the people of Funky Town to their feet. Stupendously fab soundtrack includes Baker Street and Electric Avenue.

Commodore 64 **£8.95**

mystery makes his own review...

QUACKSHOT

by Creative Sparks

A mad survival chase game, with the player as night watchman in a toy factory, pursued by crazed clockwork ducks. (I know the feeling).

Spectrum 48K **£2.50**

DESERT BURNER

by Creative Sparks

Desert Burner is a powerful road bike capable of megasonic speeds. The rider has to deliver crucial weapon plans, but there are enemies attacking and traps to evade. Skilful, huh?

Spectrum 48K **£2.50**

A VIEW TO A KILL

by Domark

The name is Bond, James Bond. The game is to tear through the 3D streets of Paris, escape from a raging inferno, then save the world from a ghastly time bomb (and the Duran Duran soundtrack!)

Commodore 64
Spectrum 48K **£10.99**

MAD DOCTOR

by Creative Sparks

As Mad Doctor, in this blood-curdlingly evil game, the player must create new life out of freshly killed body parts. If he arouses the villagers' suspicions, they'll kill him. A light touch on the scalpel is required.

Commodore 64 **£8.95**

SHADOWFIRE

by Beyond

The player has a 100 minutes of real time to rescue Ambassador Kryxix held captive by the horrible General Zoff. All commands are issued through picture symbols to enable the game to be played at a truly intergalactic pace.

Commodore 64
Spectrum 48K **£9.95**

Super Gran

THE ADVENTURE by Tynesoft

A whacky chase game based on the popular TV pensioner. Put on your kilt and your lavender water, wave your walking stick and zap the evil Scunner Campbell before he blams the world to bits.

Commodore 64 Commodore 16
Spectrum 48K **£9.95**

DUN DARACH

by Gargoyle

Cuchulainn, the hero, is trying to free a companion imprisoned in the corrupt city of Dun Darach. But first he must take part in hundreds of minor adventures. A game for brilliant warped minds.

Spectrum 48K **£9.95**

FRANKIE

by Ocean

A perilous journey to the centre of the pleasuredome with those whacky Frankie boys. Plus a unique live recording of Relax.

Commodore 64
Spectrum 48K **£9.95**

Something for zappers everywhere:

JUMP JET



by Anirog

A sophisticated combat and flight simulator, requiring a strong nerve, and a head free of blancmange. The mission – to seek and destroy in ever-deteriorating weather.

Commodore 64 **£9.95**

"Things for sporty hunks to play:"

Graham Gooch's TEST CRICKET

from Audiogenic

Superb sports simulation, with lots of googlies, maidens, and silly mid-offs. It's just like real cricket, except that, with you in control, England may even win the Ashes!

Commodore 64 **£9.95**

"Something to de-scramble your brain with:"

MINI OFFICE

by Database

Comprising a word processor – for writing letters and reports, a database – for storing addresses, and a spreadsheet – for storing complicated numbers. Pretty clever stuff, huh?

BBC Micro **£5.95**

"A bonus for all you 'Stuff' fans:"

DON'T BUY THIS

by Firebird

A cringe-along compilation containing the five most forgettable games of all times – about as exciting as watching grass grow. (Recommended for insomniacs).

Spectrum 48K **£2.50**

Win

UNMASK THIS MONTH'S MYSTERY MICROGAMER AND WIN A 2-PACK PROGRAM PRIZE – TEN PRIZES MUST BE WON.



If you know the answer, send this coupon in to us, not later than 30 July 1985. The first ten correct entries drawn will each receive FRANKIE GOES TO HOLLYWOOD and MAD DOCTOR.

I say the Mystery Microgamer is: ______

Send me your latest full list of software programs.

Name ______

Machine ______

Address ______

______ Postcode ______

SEND TO: Thorn EMI Computer Software, Mystery Microgamer Competition, Thomson House, 296 Farnborough Road, Farnborough, Hants. GU14 7NU

YC1

All games featured above are available from Laskys, WH Smith and other good software stores.

COMMODORE 64, BBC AND SPECTRUM

THE PROGRAMS given here will enable Spectrum, BBC, and CBM-64 owners to download via *Your Computer's* Telsoft service. Each month for each machine we transmit at least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program, Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with

Figure 1. CBM-64.

```
5 REM   HEX LOADER FOR CBM 64   FIG.1
6 REM
10 FOR I=680 TO 727:READA:POKEI,A:T=T+A
20 NEXT:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ";T-6716:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS";A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT:PRINT"ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINTA;:INPUTD$
160 IF D$="END" THEN GOTO 900
170 IF LEN(D$)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B$=MID$(D$,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
210 POKE A+B,D:T=T+D:NEXT
220 B$=MID$(D$,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+8:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+D)C$"??"
290 B=8:NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B$)
310 C$=MID$(B$,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D*16+X:NEXT:RETURN
400 X=ASC(C$)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H$="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;"? ";:T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT"=";
560 Y=INT(T/256):PRINT MID$(H$,Y+1,1);
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 900
600 PRINT MID$(H$,INT(X/16)+1,1);
610 PRINT MID$(H$,1+(XAND15),1);:RETURN
800 SYS 680:C$=CHR$(34)
810 PRINT:PRINT" TO RELOAD CODE :"
815 PRINT:PRINT"  LOAD"C$"DOWNLOAD";
820 PRINTC$",1,1  (RETURN)"
825 PRINT:PRINT"  THEN TYPE   NEW";
830 PRINT"  (RETURN)"
835 PRINT:PRINT"TO RUN THE PROGRAM";
840 PRINT"  SYS 51000  (RETURN)"
900 PRINT:PRINT:PRINT"1  ENTER DATA"
910 PRINT:PRINT"2  PRINT DATA"
920 PRINT:PRINT"3  SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,800
```

Figure 2. CBM-64.

```
51000 ? A9068D21D08D20D0=3E2
51008 ? A90F8D8602A90E20=2E4
51016 ? D2FFA9008D15D0A9=4DD
51024 ? FF8D0A02BA8E92CE=510
51032 ? 20CAC920C7CB20F8=4D5
51040 ? CAAD90CEC931F023=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C5BC7A914=410
51064 ? 20D2FF202FCBD0DB=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C4AC82063=411
51088 ? CC2022CDA95B85FD=4F1
51096 ? A9CE85FE2028CDA0=547
51104 ? 002095CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA901D007A944=4EF
51128 ? 20D2FFA90885BA20=4B9
51136 ? 25CDA90820ABCCA9=4A3
51144 ? BD85FDA9CD85FEA0=6A0
51152 ? 002095CC2025CD20=383
51160 ? 95CC9848A0048C83=4CC
51168 ? CE20D8C968A82025=4C4
51176 ? CD2095CC9848A906=4C5
51184 ? 8D83CE20D8C9ADA7=5E3
51192 ? CE85FBADA8CE85FC=6EA
51200 ? 68A82060CBA90185=38A
51208 ? B885B998A293A0CE=539
51216 ? 20BDFFAEA9CEACAA=567
51224 ? CEE8D001C82025CD=479
51232 ? A9FB20D8FF20F1CB=597
51240 ? 6020D9CCC90DD00B=3FE
51248 ? A90085C7A92020D2=3E0
51256 ? FFA90D20D2FF60A9=4E7
51264 ? 0D2029C8A90D20D2=306
51272 ? FF602063CCA000A9=43F
51280 ? FF9993CEC8D0FA20=5FB
51288 ? D2CB90FB20D2CBB0=5ED
51296 ? FB0D72CEA0008C7C=4D0
51304 ? CE8C7DCE202ECCAD=4D4
51312 ? 72CE29F0C900D0E4=5C6
51320 ? 20D2CBB0DA9973CE=599
51328 ? C8202ECCC009D0F0=4EB
51336 ? A000AD76CE2900D0=492
51344 ? 0FA52B85FB18A52C=3D8
51352 ? 6D75CE85FC4CAAC8=587
51360 ? AD78CE85FBAD79CE=607
51368 ? 85FC20D2CBB0A820=55E
51376 ? D9CC20D2FFC820D9=607
51384 ? CC202ECCC010D0EA=528
51392 ? A92020D2FFAD75CE=56A
51400 ? 202ECD20D2CBB087=4D7
51408 ? CD7CCEF00BA95820=503
51416 ? D2FF2030C84C57C8=52C
51424 ? 20D2CBB0F8CD7DCE=65D
51432 ? D0EBAD75CEA8B993=687
51440 ? CED00E2030C8A991=4EE
51448 ? 20D2FF4C7EC94C57=51F
51456 ? C8A0008C7CCE8C7D=447
51464 ? CE20D2CBB0F091FB=5BF
51472 ? 202ECCC8CC77CED0=4D3
51480 ? F020D2CBB0E0CD7C=59E
51488 ? CEF000A95820D2FF=4D8
51496 ? 4C57C820D2CBB0CE=4CE
51504 ? CD7DCEF0034C23C9=473
51512 ? 20ACCB2030C8AD75=409
51520 ? CEA0A9009993CEAD=506
51528 ? 84CEC902D02520BC=436
51536 ? CBA9C820F3CBA955=568
51544 ? 2016CDA95020F3CB=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? B993CED02398D0F7=5D4
51568 ? 4C5BC7A9552016CD=3DF
51576 ? 20F1CB4C63C9AC77=4EF
51584 ? CE20D2CB88D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53E
51600 ? 4C5CC8A52B85FBA5=4F5
51608 ? 2C85FCA000B1FB99=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 0BA52285FBA52385=447
51632 ? FC4C9BC918A5FB69=57D
51640 ? 02852D852F8531A5=37B
51648 ? FC6900852E853085=412
51656 ? 32602063CCA9028D=3E1
51664 ? 84CEA90B8D02DE60=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098DCDCE202FCB=4D4
51688 ? C914F016C90DF051=4E2
51696 ? C924D01920D2FF8D=544
51704 ? C3CEE84CE5C9E000=64B
51712 ? D0E3E000F0DF20D2=554
51720 ? FFCA4CE5C9C93090=554
51728 ? D4C93A901548ADC3=444
51736 ? CEC924F004684CE5=460
51744 ? C968C94190BFC947=4BA
51752 ? B0BB20D2FF38E930=4D5
51760 ? C90A9002E907E005=36A
51768 ? F0AB9DC3CEE84CE5=61A
51776 ? C9E000F0A0E001D0=52A
51784 ? 07ADC3CEC924F095=4FF
51792 ? A92020D2FFA9FF9D=54F
51800 ? C3CEA2008ECFCE8E=544
51808 ? D0CE8ED1CE8ED2CE=659
51816 ? ADC3CEC924D006A9=512
51824 ? 0F8DCDCEE8BDC3CE=5DD
51832 ? C9FFF01D20CBCAB0=5B2
51840 ? 3418BDC3CE6DCFCE=524
51848 ? 8DCFCEA9006DD0CE=566
51856 ? 8DD0CEB020E84C75=534
51864 ? CAADCFCEAC83CE99=642
51872 ? A3CEC8ADD0CE99A3=660
51880 ? CEC8188C83CEAC82=561
51888 ? CEAE81CE602025CD=4ED
51896 ? A2008D41CEC921F0=500
51904 ? 0720D2FFE84CBACA=570
51912 ? 4CDEC9ADCDCE8DCE=65E
51920 ? CEADCFCE8DD1CEAD=6C1
51928 ? D0CE8DD2CE18ADD1=639
51936 ? CE6DCFCE8DCFCEAD=68F
51944 ? D2CE6DD0CE8DD0CE=6BE
51952 ? B005CECECED0E660=625
51960 ? 2063CCA90F8D8602=414
51968 ? A95185FDA9CD85FE=575
51976 ? A000209DCC2025CD=343
51984 ? 209DCC209DCC209D=3DF
51992 ? CC2022CD20A9CC20=3A0
52000 ? 95CC2022CD2095CC=411
52008 ? 202FCB20D2FF608E=421
52016 ? 81CE8C82CE2069CC=4B0
52024 ? 20ECCC20CACCC900=48F
52032 ? D00D20FDCCC931F0=4F0
52040 ? 062001CC4C35CB8D=314
52048 ? 80CEAE81CEAC82CE=597
52056 ? 60AE92CE9A4C5BC7=4CE
52064 ? 2022CDA92285FDA9=465
52072 ? CE85FEA0002095CC=4DA
52080 ? 2025CDA00FA92099=393
52088 ? 93CE88D0FA8D93CE=619
52096 ? 202FCBC914D010C0=417
52104 ? 00F0F520D2FF88A9=50F
52112 ? 209993CE4C80CBC9=50A
52120 ? 0DF00B20D2FF9993=4BD
52128 ? CEC8C010D0DAA920=579
52136 ? 20D2FF60A92020D2=4B4
52144 ? FFA94F20D2FFA94B=58C
52152 ? 20D2FF60A9138D00=452
52160 ? DEA9128D00DE60A9=4CD
52168 ? 538D00DEA9528D00=40E
52176 ? DE60A996108D87CE=547
52184 ? 8C82CEAC82CE2004=4D4
52192 ? CC20ECCCCE87CED0=677
52200 ? 02306020FDCCB0EE=509
52208 ? 60A9FA8C82CEA820=597
52216 ? 04CC88D0FAAC82CE=616
52224 ? 602004CC8AA2A8CA=3EE
52232 ? D0FDAA2069CC6020=454
52240 ? 25CDA90220ABCC20=364
52248 ? 95CCAD8ECE20D2FF=573
52256 ? A92020D2FFA90320=3A6
52264 ? ABCC20D8C9604D7D=48A
52272 ? CE8D7DCEA208AD7D=4AA
52280 ? CE2A9010AD7DCE49=411
52288 ? 088D7DCEAD7CCE49=460
52296 ? 108D7CCE2E7CCE2E=3D5
52304 ? 7DCECAD0E160A000=516
52312 ? A900990D4C8C018=40E
52320 ? D0F660A99320D2FF=5B3
52328 ? 6048A5A2290FD01F=37E
52336 ? A5D448A5A22910F0=4A1
52344 ? 05A9A44C80CCA920=42B
52352 ? 20D2FFA90085D4A9=51C
52360 ? 9D20D2FF6885D468=53F
52368 ? 6020D2FFC8B1FDC9=620
52376 ? 21D0F6C8602025CD=4B9
52384 ? A90C20ABCC2095CC=46D
52392 ? 60A9058E81CEAAA9=4E6
52400 ? 2020D2FFCAD0FAAE=603
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160A91460A9=456
52424 ? 7F6020E4FFC9C190=5C4
52432 ? 07C9DBB00338E960=4AF
52440 ? 60C941900EC95B90=494
52448 ? 08C961900 6C97BB0=49C
52456 ? 02492060488A4808=2D5
52464 ? 20E1FFD0034C59CB=533
52472 ? 2868AA6860AD00DE=485
52480 ? 49016A9003A90060=250
52488 ? AD01DE6048AD00DE=3C7
52496 ? 49026A6A6860200C=223
52504 ? CDB0FB8D01DE20EC=508
52512 ? CC602025CD2028CD=373
52520 ? A90D20D2FF604829=3A0
52528 ? F06A6A6A6A0930C9=3CA
52536 ? 3A300318690720D2=21F
52544 ? FF68290F0930C93A=31B
52552 ? 300318690720D2FF=2F4
52560 ? 60444F574E4C4F41=2C4
52568 ? 44204D454E552131=243
52576 ? 2020205245434549=228
52584 ? 5645213520202045=1FE
52592 ? 5849542054 4F2042=28A
52600 ? 4153494321362020=22F
52608 ? 2053415645204259=28A
52616 ? 5445532128205553=285
52624 ? 452012205 3544F50=26D
52632 ? 209220544F205245=2C4
52640 ? 5455524E20544F20=2CC
52648 ? 4D454E5520292145=28C
52656 ? 4E544552204E554D=2F9
52664 ? 4245522021494620=281
52672 ? 4144445245535320=2E6
52680 ? 495320494E204845=2C8
52688 ? 582C119D9D9D9D9D=476
52696 ? 9D9D9D9D9D9D9D9D=5C0
52704 ? 9D9D9D9D50524546=481
52712 ? 4958205749544820=305
52720 ? 2421535441525420=2E3
52728 ? 4144445245535320=31E
52736 ? 464F522041524541=220
52744 ? 202146494E414C20=1D3
52752 ? 4144445245535320=236
52760 ? 464F522041524541=238
52768 ? 202150524F475241=22C
52776 ? 4D205449544C4520=237
52784 ? 204D415820313620=1E5
52792 ? 4348415227532920=219
52800 ? 21124E4F54205641=21B
52808 ? 4C4944922C205452=2A5
52816 ? 5920414741494E20=249
52824 ? 3A20214449534320=216
52832 ? 4F52205441504520=26B
52840 ? 2820442F54202920=1E0
52848 ? 3F21000000000000=0D0
```

TELSOFT



A reminder of how to use the Telsoft service.

a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemond 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&69FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>&6FB7 THEN 280
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT ~A" ";
80 INPUT ":" B$,C$
90 IF LEN(B$) <>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$= MID$(B$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 X$= MID$(B$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR M = 1 TO LEN (C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=8*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6FB7
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6A00 :A9CBA0FEA20120F4,4C6
6A08 :FF20616C204B6DC9,38A
6A10 :31F00BC934F0E9C9,4CB
6A18 :35F0064C0C6A4C47,200
6A20 :6AA90C20E3FFA9E8,4B2
6A28 :A000A2FF20F4FFA9,4FD
6A30 :03A20020F4FFA902,363
6A38 :A20220F4FFA9CBA0,4CB
6A40 :FEA20020F4FF60A9,4BC
6A48 :0C20E3FF20F76BA9,439
6A50 :15A20120F4FFA000,3EB
6A58 :A9FF8099856FD0FA,507
6A60 :A915A20120F4FF20,394
6A68 :0C6C90F8200C6C08,34B
6A70 :FBA0000477B47B04,416
6A78 :79847AB47B057020,38B
6A80 :D56DA57029F0C900,4B9
6A88 :D0E2200C6C00D099,46B
6A90 :7100C020D56DC009,364
6A98 :D0F0A000A5742900,422
6AA0 :D00BA51C85761BA5,354
6AA8 :1D65738577200C6C,209
6AB0 :00052 0E3FFC020D5,524
6AB8 :6DC010D0F0A57320,435
6AC0 :B26D200C6CB0A0C5,3CC
6AC8 :7AF000A95020E3FF,470
6AD0 :20E7FF4C676A200C,34F
6AD8 :6C000CC570F000A9,40C
6AE0 :5020E3FF20E7FF4C,4AC
6AE8 :676AA573A09905AF,43E
6AF0 :D00E20E7FFA90020,390
6AF8 :E3FF4C036B4C676A,469
6B00 :A000847A847B200C,2C9
6B08 :6CB0F2917620D56D,477
6B10 :CBC475D0F1200C6C,45A
6B18 :B0E3C57AF000A950,4CE
6B20 :20E3FF20E7FF4C67,4BB
6B28 :6A200C6CB0CFC570,3C1
6B30 :F000A95020E3FF4C,447
6B38 :676A20C76B20E7FF,429
6B40 :A573A0A9009985AF,3F6
6B48 :A58AC902D05020D7,419
6B50 :6BA9C820556CA955,3B8
6B58 :20306EA95020556C,298
6B60 :A915A20120F4FF20,394
6B68 :F76BA471C0000985,505
6B70 :4FD05190D0F7A90C,4A4
6B78 :20E3FF20A56DA95A,437
6B80 :8502A96F8503A907,3D7
6B88 :20006E20F86D20A0,2D8
6B90 :6DA90520006EA900,2DA
6B98 :20E3FF20F86DA902,302
6BA0 :20E0FF4C0C6AA955,38F
6BA8 :20306EA99620556C,2DE
6BB0 :4C6A6BA475200C6C,2D2
6BB8 :00D0FA200C6C200C,316
6BC0 :6C4C4B6B4C6C6AA9,336
6BC8 :2020E3FFA96F20E3,430
6BD0 :FFA96B20E3FF60A9,51E
6BD8 :9CA000A6BAE002D0,41E
6BE0 :0BA21320F4FFA212,3B7
6BE8 :20F4FF60A29723F4,4C0
6BF0 :FFA29620F4FF60A9,553
6BF8 :9CA000A6BAE002D0,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20F4FF6018A99685,44F
6C10 :0F847EA991A20020,38D
6C18 :F4FFB009C0070005,448
6C20 :6B6B4C0C6AA47E20,2D4
6C28 :496CC60FD0023B60,374
6C30 :A58AC902D0062079,369
6C38 :6EB0EC60A991A201,447
6C40 :20F4FF90A47E80DF,55C
6C48 :608AA2D2CAE8CAD0,5AA
6C50 :FBAA60A900847EA0,450
6C58 :20496C80D0FAA47E,449
6C60 :60A9E8A000A2FF20,452
6C68 :F4FFA900050AA90C,460
6C70 :20E3FF20A86DA904,3E4
6C78 :20006EA9090582A9,2F0
6C80 :6F0583A00020F86D,39C
6C88 :20156DC941F000C9,370
6C90 :42F011C943F0174C,3A2
6C98 :616CA900A20120F4,335
6CA0 :FF4C876CA900A203,3C4
6CA8 :20F4FF4C876CA900,433
6CB0 :A20420F4FFE68AA5,4CE
6CB8 :7C20E3FFA47E20A8,468
6CC0 :6DA90820006E20F8,2C4
6CC8 :6DA01720156DC941,2D0
6CD0 :F000C942F011C943,413
6CD8 :F0174C616CA907A2,372
6CE0 :0120F4FF4C096DA9,37F
6CE8 :07A20320F4FF4C09,314
6CF0 :6DA907A20420F4FF,3D6
6CF8 :E6BAA5BAC907D009,443
6D00 :A9E8A000A20120F4,3E0
6D08 :FFA57C20E3FF2053,495
6D10 :6C20536C6020A86D,2E3
6D18 :A90520006E20F86D,2C1
6D20 :20A86DA90520006E,274
6D28 :20F86D20A86DA905,368
6D30 :20006E20F86D20A8,2DE
6D38 :6D847EA90320006E,2A9
6D40 :A9D220E0FF857CA0,4D8
6D48 :A90C20E3FF20A86D,3EF
6D50 :A90720006EA99A85,306
6D58 :02A96E8583A00020,361
6D60 :F86D20A86D20996D,3C0
6D68 :20996D20996D20A8,317
6D70 :6DA90A20006E20F8,2C6
6D78 :6D20A86DA9022000,278
6D80 :6E20F86D20A86D20,348
6D88 :E7FFA9D220E0FF48,5A8
6D90 :A90FA20020F4FF68,3D5
6D98 :60A90820006E20F8,2B7
6DA0 :6D20A86D6020A86D,33A
6DA8 :20A86D20E7FF20E7,445
6DB0 :FF604829F06A6A6A,3FE
6DB8 :6A0930C93A300318,1F1
6DC0 :690720E3FF60290F,312
6DC8 :0930C93A30031869,1F0
6DD0 :0720E3FF60457B85,3AE
6DD8 :7BA200A57B2A900C,388
6DE0 :A57B4900857BA57A,390
6DE8 :4910857A267A2678,299
6DF0 :CAD0E8A020E3FFC0,5AC
6DF8 :B182C90DD0F6C860,4F7
6E00 :B67DAAA92020E3FF,470
6E08 :CAD0FAA67D60C97F,55F
6E10 :D008A98620F4FFE0,4FD
6E18 :00F012A97FC92000,3C3
6E20 :0EC90AF00AC90DF0,3A1
6E28 :0AC907F002A900A0,201
6E30 :857CB67D047EA991,440
6E38 :A20120F4FFA903A2,404
6E40 :0720F4FFA996A200,403
6E48 :20F4FF902902F0F4,4BA
6E50 :A47CA997A20920F4,41F
6E58 :FFA903A20420F4FF,464
6E60 :A991A20020F4FF00,49F
6E68 :09C007D0056B684C,2C1
6E70 :0C6AA57CA67DA47E,3DC
6E78 :60847EB67DA996A2,446
6E80 :0020F4FF902901F0,3CD
6E88 :08A996A20920F4FF,400
6E90 :9018900138A67DA4,340
6E98 :7E60444F574E4C4F,281
6EA0 :4144494E47204D45,215
6EA8 :4E550D3120202052,193
6EB0 :4543454956450D34,1F2
6EB8 :2020205345542042,1AE
6EC0 :6175642052617465,2E6
6EC8 :0D35202020455849,1B8
6ED0 :5420544F20424153,20D
6ED8 :49430D454E544552,217
6EE0 :204E554D4245520D,1F6
6EE8 :2020555345204354,1EC
6EF0 :524C204720544F20,1F5
6EF8 :52455455524E2054,254
6F00 :4F204D454E552029,1ED
6F08 :0D53455420545241,200
6F10 :4E534D4954204261,24E
6F18 :756420526174650D,292
6F20 :4120202037352042,16F
6F28 :6175640D42202033,1FC
6F30 :303020426175640D,209
6F38 :4320313230302042,188
6F40 :6175640D53455420,253
6F48 :5245434549564520,223
6F50 :4261756420526174,2C3
6F58 :650D50524F475241,23D
6F60 :4D20204C4F414445,1F2
6F68 :4420206F6B0D5052,28D
6F70 :45535320414E5920,213
6F78 :4B455920464F5220,218
6F80 :4D454E550D202020,1A2
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k        fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23658,8: CLS : PRINT
30 INPUT "Start Address ";a
50 IF a>61135 THEN GO TO 280
60 IF a<60000 THEN GO TO 20
70 PRINT a;
80 INPUT " :";b$
85 IF b$="END" THEN GO TO 280
90 IF LEN b$<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y: NEXT n: LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT ":";b$: GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23658,0: STOP
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :EDCD36ECCD66EDCD,631
60016 :50EDCD47EE30F0CD,5AF
60024 :B8EDFE31CA99EAFE,69A
60032 :35CA87EAC366EACD,5D0
60040 :15ED3EFACDB4EDCD,5FD
60048 :15EDC9CD15EDC366,553
60056 :EACD66ED11E5EE06,58C
60064 :003EFF121310FCCD,458
60072 :15EE11CDEE06173E,3D2
60080 :20121310FCCD1FED,3DA
60088 :30F0CD50EDCD1FED,588
60096 :30FB3265EF3E0032,3E9
60104 :6CEF326FEF3270EF,544
60112 :3A65EFCDE8EC3A65,5A1
60120 :EFE6F0FE0020DE0E,627
60128 :091165EFCD1FEDDA,501
60136 :AAEA1312CDE8EC0D,552
60144 :20F23A69EFEA0020,51A
60152 :0021485C3A68EF0E,36C
60160 :004709226BEF0E00,1DA
60168 :11CDEECD1FED309A,47F
60176 :12130CCDE8EC79FE,45C
60184 :1020F03A68EFCDB1,447
60192 :ECCD1FEDDAAAEA21,574
60200 :6FEF0E20133E5011,326
60208 :E0EE12133E0012CD,340
60216 :D7ECCDA6ECC3AAEA,681
60224 :CD1FEDDAAAEA2170,510
60232 :EF0E20E121E5EE3A,524
60240 :60EF056F3E00CA67,3CC
60248 :3E000E2000CDD7EC,40F
60256 :3E2132005CC3FFEB,402
60264 :3E00326FEF3270EF,3C7
60272 :ED5B6BEF0E00CD1F,40C
60280 :EDDAAAEA3273EFCD,634
60288 :EBEC3A68EFFE0020,506
60296 :053A69EFEA003A73,432
60304 :EF12130C3A6AEF09,3FC
60312 :20DCCD1FEDDAAAEA,5D0
60320 :216FEF0EC22DEB0D,504
60328 :1FEDDAAAEA2170EF,5A2
60336 :0EC22DEB3EAF32E2,509
60344 :EE3E6832E3EE3E00,490
60352 :32E4EE3A085CFE21,501
60360 :2003CD15EECD07EC,553
60368 :CDA6EC21E5EE3A60,5C5
60376 :EF056F3E00CA6736,422
60384 :0021E5EEED4B66EF,561
60392 :0C7EFE00C20DEA23,4FC
60400 :0020F63EFACDB4ED,509
60408 :3E01D3FEC366EACD,5E0
60416 :1FED30F8C38DEAF3,594
60424 :0603AFD3FF10FB3E,308
60432 :40D3FF3EFFD3FF3E,56F
60440 :31D3FF3E0F320F5C,305
60448 :320D5C32485C3E01,250
60456 :D3FE21915CC09EFB,568
60464 :CD5BEDC366EACD15,52F
60472 :EECD66ED3E01D3FE,556
60480 :2165EE3E00CD0FEC,442
60488 :CD04ECCDA3ECCDA6,654
60496 :EC23CD77ECCD77EC,58F
60504 :CDA0ECCD04ECCDA6,661
60512 :EC233E00CD0FECCD,4CF
60520 :04EC23CDA3EC3E03,498
60528 :CD0FECCD04ECC9CD,688
60536 :A3EC3E07CD0FECCD,561
60544 :04EC23C97EFE00C8,520
60552 :CD08ED23C304ECFE,651
60560 :00C8F53E20CD08ED,520
60568 :F13DC30FECCDA0EC,65D
60576 :CDA3ECCDA6EC3E00,5A6
60584 :CD08ED3EFF320C5C,574
60592 :C9F513E6F8CB1FCB,60C
60600 :1FCB1FCB1FF630FE,4CF
60608 :3AFAC6ECC6071213,490
60616 :F1E60FF630FE3AFA,606
60624 :D4ECC6071213C921,46C
60632 :CDEEE5CD04ECE106,69C
60640 :173E20772310FC3E,339
60648 :0077C9E52170EFAE,538
60656 :77C50E007EA7CB17,449
60664 :300D7EEE00773A6F,3C9
60672 :EFEE10326FEF3721,305
60680 :6FEFCB1623CB160D,358
60688 :20E2C1E1C9110581,394
60696 :216A00CDB503C93E,32F
60704 :963277EFCD47EDDA,529
60712 :2EEDF1C366EACDAC,5C0
60720 :ED7BE601F602D3FE,548
60728 :AF2177EF35200237,2FC
60736 :C9CD77ED30E8C9CD,5F0
60744 :47EEDBFECBC837C9,5E6
60752 :F5DBFF3A81EFFE00,5C7
60760 :20043E3618023E37,187
60768 :D3FFDB7FF1C9F53A,675
60776 :81EFFE0020043E36,376
60784 :D3FFCD5BEDF1C93E,644
60792 :00DBFFE60037C8D0,59.
60800 :FFE60237C8DBFFE6,626
60808 :302004DB7FA7C93A,3E0
60816 :81EFFE0020043E37,397
60824 :18023E36D3FFDB7F,452
60832 :C9CD47ED3A73EFD8,5DE
60840 :F1C366EAF53ED23D,5EE
60848 :20FDF1C9CDACED3D,62A
60856 :20FAC9C5D5E5F5FE,780
60864 :7F2013CDF9EDFE0C,537
60872 :200CFE0D20053E20,28A
60880 :D73E0D710103E20,34F
60888 :D73E08D73A085CFE,4E8
60896 :2120033E08D73E5F,2E6
60904 :D73E00D7F1E1D1C1,640
60912 :C9FE07201CFECB20,4F3
60920 :19FE0C2014FE0820,300
60928 :10FE0D200CFE20FA,367
60936 :0FEEFE00FA11EE3E,4A0
60944 :00C93E07C9CD600D,32C
60952 :3E02CD01163E1032,1C4
60960 :095CC93E121601CD,302
60968 :1122C93E121600CD,257
60976 :1122C9C5D5E53E02,3EB
60984 :CD0116CD47EE30F8,451
60992 :CD5CEEE1D1C1C93A,5CD
61000 :385CCB6F200C3A00,20F
61008 :5CF521385CCBAEF1,4C3
61016 :A7C937C9F5111000,3DE
61024 :CD10EDF1C9444F57,4D6
61032 :4E4C4F4144494E47,2B4
61040 :204D454E550D3120,216
61048 :2020524543454956,276
61056 :450D352020204578,217
61064 :697420746F204261,328
61072 :7369630D20205573,20F
61080 :652053796D626F6C,393
61088 :205368696674202D,380
61096 :204720746F205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E5520290D45,27B
61120 :4E544552204E554D,309
61128 :4245522000000000,1C1
```

I could do that...

"Poor is the pupil who does not surpass his master" Leonardo da Vinci is supposed to have said. Taking this principle to heart, for this month's £15 competition we would like you to outdo John Ransley by improving on the demonstration program he gives elsewhere in First Bytes.

In other words we want you to write your own Snake program making it — if possible — faster and more elaborate than John Ransley's, but not longer. It can be for any machine and can contain Peeks, Pokes, user defined graphics, print statements or whatever takes your fancy.

Despite the simplicity of the task we set for June's competition the response was disappointing. We were looking for an animation program based only on print statements and without any user-defined graphics.

From the few entries received we awarded the prize to Giorgio Berardi, Via Buonarroti 60, 47100 Forli, Italy. His program runs on the Spectrum but could easily be converted for other machines.

```
  5 LET a$="I COULD DO THAT"
 10 LET x=10: LET v=(32-LEN a$)
/2: LET p=1
 20 FOR n=30 TO v STEP -1
 30 PRINT AT x,n;a$(p)+" "
 40 NEXT n
 50 LET v=v+1: LET p=p+1
 60 IF p<(LEN a$+1) THEN GO TO
20
 70 PAUSE 50: LET v=(32-LEN a$)
/2
 80 FOR x=11 TO 20
 90 PRINT AT x,v;a$;AT x-1,v;"
               ": REM Number of
spaces=LEN a$
100 NEXT x
110 PAUSE 50: LET p=1
120 FOR n=19 TO 1 STEP -1
130 PRINT AT n,v;a$(p);AT n+1,v
;" "
140 NEXT n
150 PRINT AT n+1,v;" "
160 LET v=v+1: LET p=p+1
170 IF p<(LEN a$+1) THEN GO TO
120
180 STOP
```

BEGINNERS first bytes

Starting out in home computing? First Bytes is for you. Just *write to Your Computer* with any hardware or software problems, no matter how small or simple.

A bluffers' guide to micros

"TIS PLEASANT, through the loopholes of retreat, to peep at such a world; to see the stir of the great Babel, and not feel the crowd". Whatever William Cowper was writing about in his 18th-century poem *The Task*, it might just as well have been computer languages, because this is something that micro users talk about a lot, but never actually do. It is thus an area wide open to bluffing.

Everybody uses Basic, which is supposed to stand for Basic All-purpose Symbolic Instruction Code. Worldly-wise micro cynics always grin and maintain they have it on personal authority from John Kemeny that he invented what the acronym stood for a long time after he invented the acronym — probably during some after dinner game played by academics at Dartmouth College, USA, back in 1960. Basic programs are just long lists of lines made up of two things: a line number and a series of statements.

Six sorts of statement go into Basic programs: assignment statements which set up a variable or manipulate it in some way, input/output statements which deal with the peripherals, like the screen or the printer, control structures like the famous Goto If or Gosub statements, plus statements related to graphics and sound, error detection — and, just in case I've forgotten something, miscellaneous. Languages which everybody talks about but never use include — Forth, Pascal, Lisp, Prolog, Logo. These are just the ones available in some form on microcomputers. More of this later, since the dedicated micro-bluffer must first be made aware of the dangers inherent in the break-out of a Basic skirmish, because this is the language everyone uses.

Just as God confounded the speech of men when they attempted to build the Tower of Babel to reach heaven, so Basic has been fractured into many dialects as a divine punishment for giving computing power to the little man instead of leaving it safely in the hands of big business, academic researchers and military intelligence.



Obedient to the principle of divide and rule, small knots of micro-hackers can be found arguing heatedly in their high-level human languages about the advantages of their Basic.

When Kemeny and Kurtz, the famous Dartmouth College double act, invented Basic routines, they revolutionised computer programming by doing away with having to assemble programs on punched cards, giving them to the machine and leaving it to extrapolate wildly from your initial error-strewn program until producing results of no use to anyone.

Now, instead of leaving the machine to single-handedly improvise from the original, or "batch program", you could join in and actually interfere with the program while it was going wrong. This is known as "real time" or "interactive" programming, and since the purpose of Basic was to allow non-programmers to program, you can imagine that the capacity for error must have been greatly enhanced.

There are several "standard" Basics. Computer languages spread rather like diseases, so that the dominant form is usually the most virulent, communicable or "portable" language, but not necessarily the most pleasant to experience. Microsoft Basic is thus generally regarded as a standard Basic because it is the most widely used, rather as engineers still end up using Fortran rather than Pascal, due to the company not wanting to spend any more money on systems development.

The American National Standards Institute spent 10 years developing a standard Basic, so it could carry out the natural function of such organisations, i.e., go around telling everyone that the standard universally adopted in the meantime was all wrong. It allows long variable names and is very structured; like most extended Basics it starts to look like another language — in this case, Pascal, a very structured programming language developed by Swiss professor, Niklaus Wirth. About the only home computer you might encounter this admittedly powerful language on, is the Enterprise — its IS-Basic is closely related to the ANSI version.

Another Basic which owes a lot to Pascal is BBC Basic. BBC owners are quietly smug about the speed of their Basic. Detractors will point out that it is highly non-standard. The BBC owner will take this as a compliment. His language has powerful commands like Repeat-Until, which you don't find on your common or garden Spectrum. People who say that BBC Basic's VDU commands aren't very elegant had better make sure they aren't struggling with an overheated power pack, aerial and cassette leads, whilst frantically looking for a mains adaptor, when they say this. BBC owners are patrician, cool. Not for them the troglodyte scrabbling of the cheapskate Spectrum owner.

The gruff, bluff Commodore 64 owner is liable to be a little spiky if the topic of Basic comes up. The strength of his machine is hardware; its language is Neanderthal. It uses the raw, ungraded old PET Basic of Commodore's early machines. The sprite graphics are a considerable improvement on the Vic-20, but a real micro-snob will remember to sneer at the fact you have to access them with Poke statements.

An Atari user would make mincemeat out of him. Both of their languages are descended from Microsoft, MBasic for

(continued on page 89)

(continued from page 87)

short. But until the C-16, graphics and sound commands were notably absent from Commodore Basic.

Having compared Basics, micro buffs can then bicker about the way they use it.

There is a fanatical hard core who insist that programs must be structured. Structuring a program is a way of making it less interesting. Instead of a fascinating tracery of Goto statements endlessly looping and recurring like smoke trails at an air-display, the idea is to construct the program out of "modules".

This makes the program easy to edit and, worse, it makes it easily understandable to other programmers. If these people had their way, a bloody crusade would be waged against the Goto statement. They have misunderstood the true spirit of computing and are very dangerous men — not so much programmers as pogrommers.

Paul Bond.

BEGINNERS first bytes

Round the disc maze



SINGLE SIDED, double sided, double density, formatted, unformatted, 40 track, 80 track — these are just some of the terms used to describe discs and disc drives. Not surprisingly the newcomer often feels more than a little bewildered. So in this follow-up to May's introduction to discs we aim to set you straight on basic disc vocabulary. Most of the terms described here refer to 5¼in. discs, which are still the most popular size on home micros.

First, the drives themselves. Most of them can only handle a fixed number of disc tracks, so a 40 track drive cannot read an 80 track disc. They are also either single or double sided. Unlike the 3in. variety 5¼in. discs cannot be turned over but require a drive with two opposing read/write heads if both sides are to be used.

These considerations apart 5¼in. drives are generally not configured for specific disc operating systems and can often be interfaced to a variety of different machines. Thus Opus, Kempston and Cumana all supply interfaces which allow BBC drives to be run on the Spectrum. You can also add a 5¼in. drive to the Amstrad disc system as a second drive.

As for the discs, most are suitable for any disc system despite the information given on their labels. Manufacturers commonly produce all 5¼in. discs as double sided and double density. The only difference between those discs which are sold for 80 track double density operation and those for single density 40 track is that the latter are subjected to less rigorous quality control.

For example discs are described as 96 TPI — tracks per inch — or 48 TPI. Although the latter are usually formatted to give 40 tracks they can generally also be used as 80 track discs.

In single density mode data is interspersed on the disc with synchronisation bits which serve to keep the timing of the disc head up to the mark. By dispensing with synchronisation bits double density systems manage to store twice as much data as single density.

The quality of the disc itself and the sensitivity of the drive is therefore much more critical. But whether a disc system runs double or single density rests largely on the disc interface and not the drive mechanism.

Discs arrive from the manufacturer in a blank unformatted state. It is then up to the user to format the disc for a particular operating system. Formatting determines how many tracks a disc has, how data is stored in sectors on each track, which tracks are allocated to the disc directory, and how many entries the directory can take.

The size of the directory limits the number of files — whether programs or data — that can be stored on the discs. Thus the BBC Disc Filing System gives 40 track discs a maximum of 32 files, while Commodore drives allow 144 files on 35 tracks.

Simon Beesley.

Pythonesque pokes — creating an arcade game

WHICHEVER MICRO you own and however much the makers may boast that its Basic runs faster than others, the fact is that you'll always be faced with something of a compromise when writing arcade-style games. Basic is a friendly language, but it's one that executes in a drawl.

Yet, as you can discover for yourself with a little experimentation, it is possible to shift individual characters and objects constructed from your micro's alphanumeric or graphic set around the screen with impressive speed — provided you use Print statements to do so.

Only problem is, games often require constant Peeking of different screen locations to suss out what's happening there, and combining active Print elements with frequent Peeks, and even the occasional Poke, can leave you with a program that runs slower than a Sinclair C5 on a dud torch battery.

Thankfully, though, there is a way of achieving acceptably fast screen movement using Pokes exclusively. It's just a matter of observing the golden rule of declaring as many fixed-value variables as you can right at the start of your program, so that subsequent sections of it can use this silicon shorthand as a short cut to faster execution.

If you'd like to refresh your memory as to the fundamentals of screen movement, animation and the use of Peek and Poke, you'll find these explained in the June and July issues of *Your Computer.*

Rather than spend too much time theorising, let's get right down to keying in a program that makes good use of Peek and Poke: on the CBM-64 it's cloned from that arcade classic in which you control a centipede or snake which has to be moved around the screen gobbling objects while avoiding hazards — not least, it's own body.

```
 10 PRINT"[CLR SCREEN]S";
    :P=-1:L=0:D=5
 20 IF SC>HI THEN HI=SC
 30 SC=0
 40 S0=1601:S1=SO+1:S2=S1+1:
    S3=S2+1:S4=S3+1
 50 S5=S4+1:S6=S5+1:S7=S6+1:
    S8=S7+1:S9=S8+1
 60 PRINT"      HI-SCORE"HI: FOR
    D=1 TO 1500:NEXT
 70 POKE S0,56:POKE S1,37:POKE
    S2,37:POKE S3,37:POKE S4,37
 80 POKE S5,37:POKE S6,37:POKE
    S7,37:POKE S8,37:POKE S9,37
 90 :
100 REM MAIN LOOP
110 PRINT"[CLR SCREEN]"
120 L=0
130 D=D+5
140 FOR I=1 to D:X=INT(RND(1))
    *900)+41
150 IF PEEK(1103+X)<>32 THEN
    X=INT(RND(1)*900)+41:
    GOTO 150
160 POKE 1103+X,90:NEXT
170 TI$="000000":GOTO 280
180 J=PEEK(56320)
190 IF J=126 THEN P=-40
200 IF J=125 THEN P=40
210 IF J=123 THEN P=-1
220 IF J=119 THEN P=1
230 S9=S8:S8=S7:S7=S6:S6=S5:
    S5=S4:S4=S3:S3=S2:S2=S1:
    S1=S0:S0=S0+P
240 REM CHECK COLLISON
250 IF PEEK(S0)=90 THEN SC=
    SC+10:PRINT"SCORE"SC:
    L=L+1:IF L=D THEN 120
260 IF PEEK(S0)=90 THEN
    GOTO 280
270 IF PEEK(S0)<>32 THEN
    GOTO 10
280 POKE S0,56:POKE S1,37:
    POKE S9,32
290 REM SCORE/TIME UPDATE
300 PRINT"SCORE[24 SPACES]
    TIME "TI$
310 IF TI$>"000060" THEN PRINT
    "[CSR HOME][8 SPACES] TIME
    EXPIRED! SCORED"SC:STOP
320 GOTO 180
```

This listing will work as it is on the Commodore 64, and on other micros with just one or two changes. In line 40, the value 1601 awarded to SO is the screen memory address that will place the snake's head — and the rest of his body will follow — near the centre of screen. The values 56 and 37 which crop up in lines 70 and 80 are the 64 screen codes for the figure 8 and percentage sign respectively.

In lines 140 and 150 you may use a different syntax to set the randomiser which peppers diamonds over the playfield.

Lines 180 and 190 make the snake move up, down, left or right under the control of a joystick; alter as necessary. On the 64, if you don't have a joystick you can

PEEK(197)

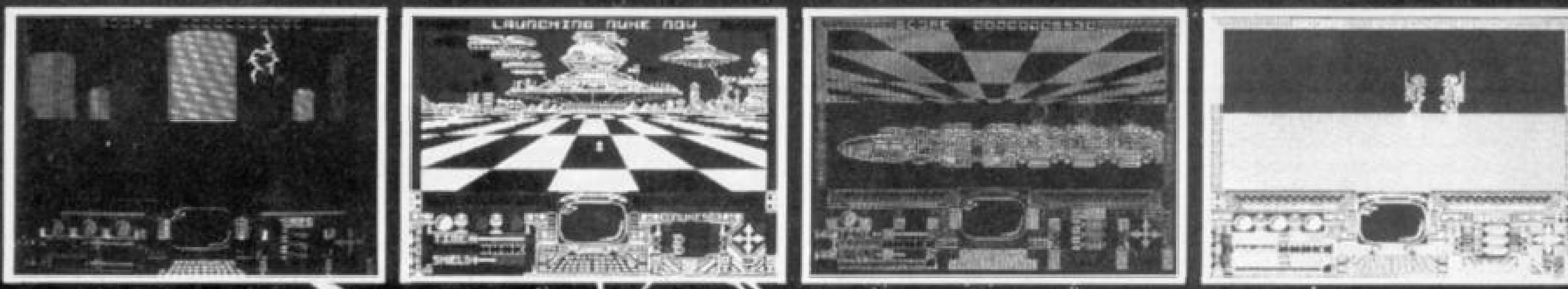
As you'll see when you play this simple demo, the "chaining" of Pokes in lines 70 and 80, and their updating in line 230, produces a surprisingly smooth — if not totally slinky — and automatically synchronised screen movement of no fewer than 10 different characters.

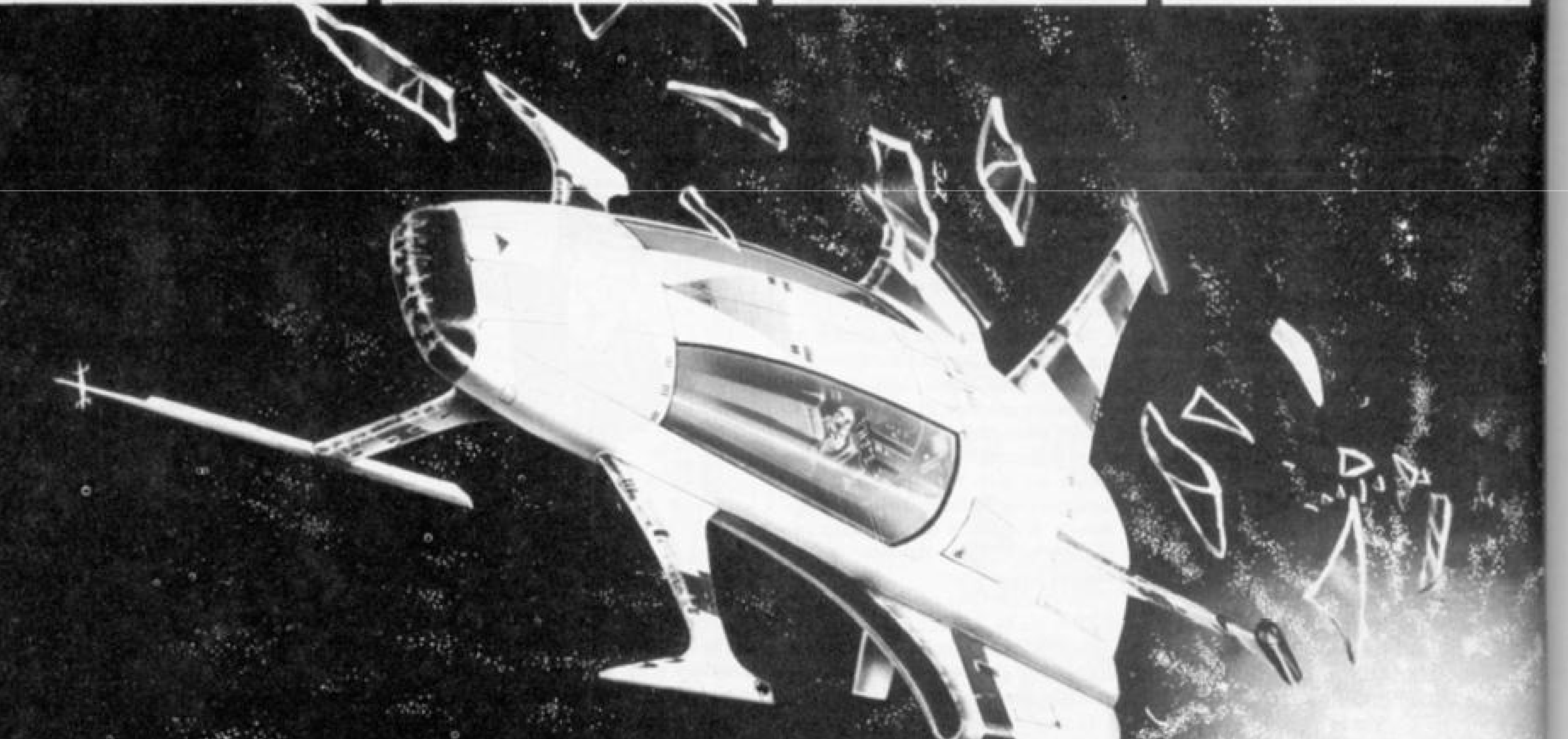
The snake wraps round — moving up or down a line depending on direction — the edges of the screen, but take him off the top, or try to have him double back on his body, and the game resets.

Line 310 gives you just 60 seconds to eat all the diamonds; beat the clock and the game resets with even more targets. The score feature gives you 10 points for every diamond taken and line 20 keeps a tally of your best effort.

This program has been kept to its bare essentials to make it easy for you to study its structure — especially the use of Peek and Poke. Once that's clear to you, you could add a few bells and whistles in the form of colour, sound effects, additional playfield obstacles, and perhaps user-defined characters to produce a more convincing snake!

John Ransley.





GLASS

Battle your way to three enemy bases.
Do you have the courage, stamina
and skill to become a Game Lord?

£7.99
SPECTRUM 48K

From

QUICKSILVA

The most powerful games in the Universe!

Available from all good software shops.

In case of difficulty write to:
QUICKSILVA Ltd. Liberty House, 222 Regent Street, London W1R 7DB tel: 01 439 0666

Argus Press Software Group

TOP★ TIPS

BREAKTHROUGH

During the production and testing of machine-code programs I have often accidentally caused my Spectrum to stick itself in an infinite loop, against which the Basic Break command will prove quite useless.

This program for either the 16k or 48k Spectrum solves this problem. By running the program before you test a machine-code subroutine or program, it will put the Spectrum into interrupt mode two (IM2). In this mode the machine will not only perform an RST566 instruction each time an interrupt occurs, but will also execute the short machine code program which will check whether or not the Break key has been pressed. If the test should prove positive it will return the machine to interrupt mode one (IM1).

Once the program loader has been entered and run, it will automatically put the program above Ramtop and execute it. Once the Break key has been pressed however, the machine must be placed back into interrupt mode two by entering the line RANDOMIZE USR 32377.

Edmund Ward.

```
[illegible]
```

SEARCHER

This is a simple machine code routine used to know what programs are loaded in a cassette, what kind of programs are, and the memory they employ. The routine runs on a CBM-64, and it's stored at C000 hex (49152 decimal). It uses some of the Rom and Kernel routines.

Once the program is typed, you must run it to store the data in memory.

When you want to know the content of a cassette, you must call this routine by typing SYS 49152.

Manuel Garcia Alvarez.

```
[illegible]
```

RESPONSE *Frame*

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

STOP REPEAT

■ I have a friend who owns a Commodore 64. Unfortunately, he is quite severely disabled as he suffers from *Freidrich's Ataxia,* which affects his co-ordination. He was hoping to be able to use his computer as a word processor in place of his electronic typewriter. Unfortunately, he has found that when he attempts to use the computer in this way, the keyboard is too sensitive, and he gets multiple responses from the keys. I would be interested to learn if there is anyway he might overcome this problem.

Albert Hunt,
Stafford.

I do not know which word processing program you are using with the 64. However, if it allows you to do some modifications in Basic, it might be useful to put a small routine like the following at the point in the program which allows input from the keyboard. This routine simply ignores any duplicate key presses, so it will not give multiple responses.

If, however, more than one press of a similar key is needed at a time — as for double letters in words — a seldom-used key — I've chosen the %, but you may have one which is more suitable — needs to be struck between the key presses needed for the double letter.

The letter which is 'passed on' to the word processor is in the variable Q$, while the routine also uses P$.

```
10 P$=""
20 Q$=INKEY$
30 IF Q$="" THEN 20
40 IF Q$="%" THEN P$="":GOTO 20
50 IF Q$=P$ THEN 20
60 P$=Q$
70 REM NOW Q$ IS USED TO 'HAND ON'
80 REM KEY PRESS TO PROGRAM ITSELF
90 PRINT Q$;
100 GOTO 20
```

CLEAN SCREEN

■ I have written several games for the Spectrum, in which I load a complete picture (saved as Screen$) into the computer, so it can sit there while the main program is loading. However, I don't want the loading message of the second program to obliterate part of the picture which is on the screen. I know I can overcome this, to some extent, by controlling the Ink and Paper colours of the loading message, but this puts some restriction on the original Screen$ picture. Is there a better way?

Arnold Thrimble,
Cirencester.

Steven Dempster of Littleworth, Stafford, has discovered a very good way of solving this problem. To stop the filename from obstructing your Screen$, first Peek 23570. Note down the answer you get. Next, type in Poke 23570,16. After the Screen$ has loaded, Poke 23570 with the original number.

ZX PRINTER OK?

■ I own a Spectrum and am thinking of buying a new, or second hand, ZX Printer. Some of my mates say that Sinclair aren't making it any more. If it is not being sold any more, will I be able to get extra paper for it?

Paul Taylor,
Sittingbourne,
Kent.

The ZX Printer has been discontinued, although independent suppliers are still producing paper for it. The *Alphacom 32* has almost totally supplanted the ZX Printer, and most Sinclair stockists also handle the *Alphacom.*

This produces blue or black (depending on the paper you buy) printing, and is far more consistent in its output than the ZX Printer ever was.

BENCHMARKS

■ When looking through magazines with reviews in them, including *Your Computer,* I quite often see a section showing 'Benchmarks, 1 to 8'. Could you please tell me what these mean, and how they are timed?

D Macroe,
Morpeth,
Northumberland.

Benchmarks are a set of standard tests which try out a function or functions of the computer under test, producing a measurable result which can be compared, to some extent, with the results of running the same tests on another computer.

The 'standard' eight benchmarks were introduced back in 1977 by the American magazine *Kilobaud.* While they are not particularly rigorous, they do offer a quick and simple solution to the problems of checking out how well the computer performs particular arithmetic functions.

The first bench mark simply runs an empty For Next loop from 1 to 1000, and times it. In the second test, a variable is set to zero, then incremented by one over and over again until it reaches 1000.

In the third test, a small bit of arithmetic is added within the program, using variables. Test four does the same thing as test three, except numbers are substituted for the variables. A "dummy" subroutine call (that is a call just to the word Return) is added in test five.

As you can see, each test demands a little more of the computer, and gives results which can be compared with the results obtained from running the tests on other machines.

DATA TRANSFER

■ I have recently changed from a ZX Spectrum to an Amstrad, and am having trouble transferring some of my programs. On the Spectrum, all the current variables and arrays are saved when the program is saved. This meant that, on reloading, it was possible to set off again from the same point, adding information to the array and variable data loaded in from the cassette. — provided, of course, Goto was used rather than run. This does not work on the Amstrad using the standard Save and Load commands. Is there a way of saving and loading current variables and array information on the Amstrad?

Brian Paget,
Aberdeenshire.

Unfortunately, there is no way of doing this on the Amstrad which is as simple as that provided on the Spectrum. The best way to achieve this on the Amstrad is to open a cassette file, and save the date to that, load in the data from tape after the main program has loaded in.

The command Openout "filename" opens an output file onto cassette for use with the current program in the computer's memory (see page 8-31 of the Amstrad manual). The program creates the first block of data, in the file with the given name. Each block consists of up to 2048 bytes of data.

A New command will abandon any open file buffered, and any data will be lost. The "opposite" command is Openin, which opens an input file from the cassette which contains information for use in the current program in your Amstrad's memory.



THE ELECTRONICS MAGAZINE
PROFESSIONALS CAN'T RESIST.
Electronics and Wireless World is the only electronics magazine to really tempt the professionals.
It's the only one they take the trouble to pick up for themselves.
That's because it's written for the engineer who sees electronics not only as a job, but also as a hobby.
It's written on a technical level that doesn't talk down to you.
It keeps you up to date with all the latest products and processes, applica-tions and equipment.
And it covers every industry where electronics is involved.
Just one look at the new look magazine and you'll see why it gets pro-fessionals like you out of the office, and down to the newsagents.
ELECTRONICS & Wireless World
The leading magazine for electronics engineers.

SOFTWARE *File*

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

Carrots from space

David Green,
Wye
Kent.

Spectrum

WHILE RECOVERING from the sheer boredom of typing in over 5K of machine code, I resolved to write a 48K Spectrum game that would be fast, fun to play, well-endowed with sound effects and that would contain less than 1.5K of machine code. Despite its unbelievably silly title, this is that program.

The game is based on the slightly improbable situation that entire battle fleets of alien telekinetic carrots, with world domination their intent, have been temporarily trapped in freak wormholes in the space/time continuum, and someone has to go in there to turn the evil vegetables into so much mangled cellulose. The only method known to science of destroying these extra-terrestrial tubers is that of skilfully placing time bombs in their path, but it is best to do this only when you are moving, as otherwise it is all too easy to blow yourself up.

Convincing your computer to take part in this wanton slaughter is relatively straightforward. The recommended procedure is as follows:

Type in listing 1 and save it. This bit sets up the graphics, the title page, and various other things of dubious artistic value.

Type in the hexloader in listing 2 or load a suitable one from tape. No self-respecting Spectrum user should be without one. Enter.

CLEAR 31999

and then type in the machine code from listing 3 using the hexloader. Save it as:

SAVE "from" CODE 33000,1300

Type in the imaginatively-titled listing 4. This actually controls the game and plays the music. Save it when you've finished and then reload from the beginning when you want to play it.

The game should work first time, but if it doesn't, check the machine code in listing 3 and the Poke's and USR calls in listing 4.

Full instructions on how to select any particular game configuration are given in the program. It would be quite easy to add a high score table by adding a few short routines to listing 4, including one at around line 320 that would use the Screen$ function to find out what the score was after every game, but that is up to you. Anyone with a disassembler might like to know what the first 200 bytes of code do, since this is not very obvious, and this is in fact a collection of subroutines which handle printing to the screen etc.

If you don't like using the cursor keys, the part of the code which deals with the bombs is from 33520 onwards, and the section which controls movement is from 33630 onwards. These articles usually end with a heartfelt plea to send cheques or postal orders to the author, but as this program has been made as short as possible, this should not be necessary.

Listing 1.

```
  50 INK 7: PAPER 0: BORDER 0: C
LEAR 31999
  60 DATA 231,165,255,24,255,24,
102,231,36,24,60,a,a,24,a,a
  70 DATA 24,a,a,60,a,a,24,36,0,
0,184,127,a,184,0,a
  80 DATA 0,a,29,254,a,29,0,a,25
4,130,178,170,154,130,254,0
  90 DATA 254,206,238,a,a,198,25
4,0,254,130,250,130,190,130,254,
0
 100 DATA 254,130,250,130,250,13
0,254,0,254,174,a,130,238,a,254,
0
 110 RESTORE : FOR n=USR "a" TO
USR "j"+7: READ a: POKE n,a: NEX
T n
 120 FOR n=USR "t" TO USR "u"+7:
 POKE n,127+(127 AND n>=USR "u")
: NEXT n
 130 LET a$="TOTAL  WIPEOUTKill
bonus:"
 140 FOR n=1 TO 25: POKE 34999+n
,CODE a$(n): NEXT n
 150 REM Now you should set up
        the UDG's by typing RUN
 160 PRINT ""
   T"
 170 PRINT "  T UT UT UT UT
 UT  T U    T     UT   T   T
 UT   T     T   T UT   T   T
 UT   T U   T   T  UT  T   T
 UT      U  T UT UT    T   T
 UT UT U"
 180 PRINT 'TAB 14;"from"
 190 PRINT '"  CE SPA
 200 PRINT AT 16,0;"  ©'85 H:
IGH                          TI
ECH"
 210 PRINT AT 21,25;"(DG)"
 220 REM The following REM lines
should not be typed in,but are
to help you with the graphics.
Enter the characters shown in G
mode with caps shift when needed
 230 REM Line 170 reads:
 T88UT88UT88UT88UT88UT88 T88U
 T      UT    T    T  UT    T
   etc.
 240 REM Line 190 reads:
  T8888UT8888UT8888UT8888UT8888U
  T8    T8  8UT8  8UT8     T8
   etc.
 250 REM Line 200 reads:
   8  813832833355 55
   8338  8  8 3854375 and so on
 260 FOR n=1 TO 3: BEEP .1,0: BE
EP .1,7: NEXT n
 270 INK 0: PRINT AT 14,0;
 280 LOAD ""CODE : PRINT AT 14,0
;: LOAD ""
 290 REM
         SAVE "carrots" LINE 0
```

Listing 2.

```
  10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2
)-48-(7 AND h$(2)>"9")
  20 INPUT "Start ";s
  30 INPUT "Finish ";f
  40 FOR n=s TO f STEP 8
  50 LET tot=0: PRINT n;": ";
  60 INPUT h$: PRINT h$;
  70 LET x=0
  80 FOR b=1 TO LEN h$ STEP 2
  90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ";: INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
 error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

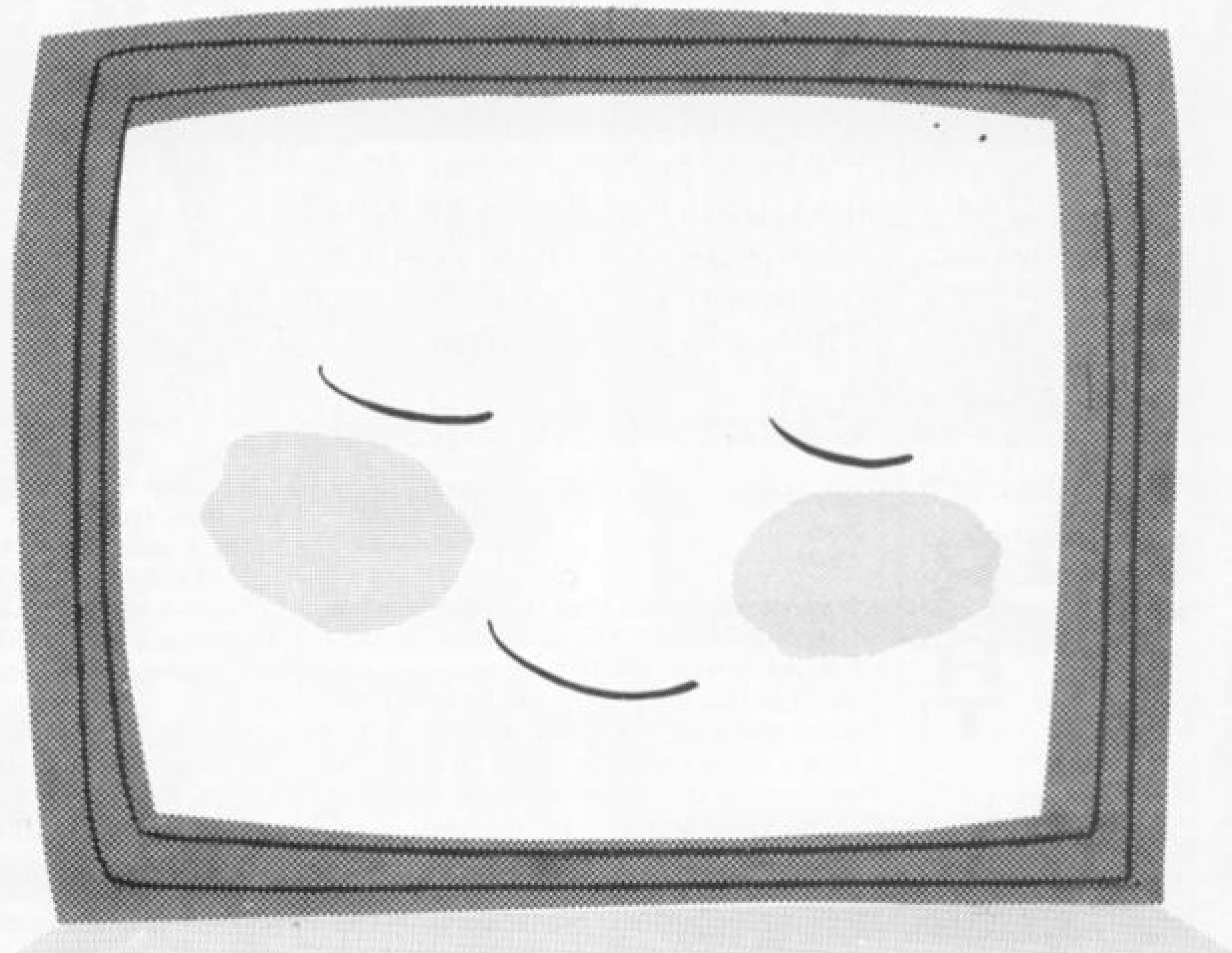
Listing 3.

```
 110 LET dif=1: LET sp=26
 120 REM RAMTOP NT comp./no data
 overlap/top interrupt level pat
ch=85EFh.Machine code=1293 bytes
 130 GO SUB 370
 140 INK 7: CLS : PRINT AT 1,1;
BRIGHT 1;"CARROTS FROM SPACE"
 150 PRINT '" Exterminate the de
adly carrots  by placing time bo
mbs in their  path."
 160 PRINT '" Keys: 7
                   5 8 and 0 to
drop bombs.         6"
 170 PRINT '" Difficulty:"''"
   Easy    Medium   Hard"
 180 PRINT AT 17,1;"Use 5 & 8 to
 change difficulty  use 6 & 7 to
 adjust speed, and          press
 0 to play."
 190 PRINT AT 13,dif*8+5; OVER 1
;"[redacted]"
 200 PRINT AT 15,9;"Start speed:
";sp;"  "
 210 BEEP .008,0: PAUSE 0
 220 IF INKEY$="0" THEN GO TO 27
0
 230 LET sp=sp-2*(INKEY$="6" AND
 sp>0)+2*(INKEY$="7" AND sp<50)
 240 PRINT AT 13,dif*8+5; OVER 1
;"[redacted]"
 250 LET dif=dif+(INKEY$="8" AND
 dif<>2)-(INKEY$="5" AND dif<>0)
 260 GO TO 190
 270 POKE 33309,(50-sp)*24: POKE
 33384,16*(dif+1)-1
 280 BORDER 2: INK 7: PAPER 0: C
LS : PRINT AT 21,0; PAPER 2;">Sc
ore:0000000 Wave:001 Lives:3<"
 290 LET zz=USR 33221
 300 GO SUB 630
 310 BORDER 0: INK 7: PAPER 0: P
RINT AT 10,11; INVERSE 1;"GAME O
VER"
 320 FOR n=1 TO 200: NEXT n
 330 IF INKEY$<>"" THEN GO TO 33
0
 340 IF INKEY$="" THEN GO TO 340
 350 GO TO 140
 360 REM tune © d.green
 370 DATA 0,12,2,11,4,9,5,7
 380 DATA 0,12,2,11,4,9,5,7
 390 DATA 12,0,11,2,9,4,7,5
 400 DATA 0,12,2,11,4,9,5,7
 410 DATA 0,12,11,2,9,4,7,5
 420 DATA 0,12,11,9,2,7,4,5
 430 DATA 0,12,11,9,7,2,5,4
 440 DATA 0,12,11,9,7,5,2,4
 450 DATA 0,12,2,11,4,9,5,7
 460 DATA 12,0,11,2,9,4,7,5
 470 DATA 0,12,2,11,4,9,5,7
 480 DATA 0,2,4,12,11,9,5,7
 490 DATA 0,12,2,11,4,9,5,7
 500 DATA 5,7,5,7,5,7,5,7
 510 RESTORE 370: FOR n=1 TO 112
 520 READ a
 530 BEEP .1,a
 540 BEEP .1,a-12
 550 BEEP .1,a
 560 BEEP .1,a-12
 570 IF INKEY$<>"" THEN RETURN
 580 NEXT n
 590 BEEP 1,12
 600 BEEP .2,0
 610 PAUSE 0: RETURN
 620 REM tune © tom keir
 630 DATA 19,14,19,21,14,21,22,1
4,21,19,14,19,18,14,18
 640 RESTORE 630: FOR n=1 TO 15
 650 READ a: BEEP .1,a-12: NEXT
n
 660 BEEP .4,7: BEEP .05,7: BEEP
 .1,7
 670 RETURN
 680 REM            THE END
 690 REM

           SAVE "space" LINE 0
```

(continued on page 95)

Has anyone ever told you...



...YOU HAVE A WONDERFUL PROFILE!

Readership Profile, that is. It's the jargon we use to describe you — the buyers and readers of Your Computer — to other people, such as Advertisers. And we probably know more about you than you think! For instance: 65% of you are under 24. 34% of you are considering buying a new computer — even though an overwhelming 96% of you already own one. On average, you each spent £376 last year on computers, software and add-ons, and during the next 12 months 75% of you intend buying more software, with 72% buying other add-ons. And that's not all

There are well over 130,000 of you buying Your Computer every month — making it the biggest selling home computer magazine in Britain. Which is good news for our Advertisers as it gives them the lowest cost per thousand of any magazine in the computer market — just £7.39. No wonder they love your profile as much as we do!

YOUR COMPUTER

Britain's biggest selling home computer magazine.

(continued from page 93)

Listing 4.

```
33000  [illegible]  = 120
33008  [illegible]  = 890
33016  [illegible]  = 790
33024  [illegible]  = 881
33032  [illegible]  = 1126
33040  [illegible]  = 936
33048  [illegible]  = 1176
33056  [illegible]  = 706
33064  [illegible]  = 741
33072  [illegible]  = 1135
33080  [illegible]  = 981
33088  [illegible]  = 838
33096  [illegible]  = 779
33104  [illegible]  = 747
33112  [illegible]  = 687
33120  [illegible]  = 657
33128  [illegible]  = 1149
33136  [illegible]  = 991
33144  [illegible]  = 422
33152  [illegible]  = 440
33160  [illegible]  = 799
33168  [illegible]  = 829
33176  [illegible]  = 895
33184  [illegible]  = 1352
33192  [illegible]  = 873
33200  [illegible]  = 870
33208  [illegible]  = 850
33216  [illegible]  = 991
33224  [illegible]  = 807
33232  [illegible]  = 858
33240  [illegible]  = 1165
33248  [illegible]  = 403
33256  [illegible]  = 909
33264  [illegible]  = 1314
33272  [illegible]  = 845
33280  [illegible]  = 839
33288  [illegible]  = 427
33296  [illegible]  = 600
33304  [illegible]  = 316
33312  [illegible]  = 742
33320  [illegible]  = 810
33328  [illegible]  = 903
33336  [illegible]  = 837
33344  [illegible]  = 506
33352  [illegible]  = 1040
33360  [illegible]  = 885
33368  [illegible]  = 682
33376  [illegible]  = 1103
33384  [illegible]  = 430
33392  [illegible]  = 520
33400  [illegible]  = 1013
33408  [illegible]  = 570
33416  [illegible]  = 964
33424  [illegible]  = 1399
33432  [illegible]  = 813
33440  [illegible]  = 694
33448  [illegible]  = 871
33456  [illegible]  = 544
33464  [illegible]  = 727
33472  [illegible]  = 863
33480  [illegible]  = 1000
33488  [illegible]  = 1291
33496  [illegible]  = 625
33504  [illegible]  = 986
33512  [illegible]  = 964
33520  [illegible]  = 711
33528  [illegible]  = 1209
33536  [illegible]  = 1080
33544  [illegible]  = 304
33552  [illegible]  = 818
33560  [illegible]  = 754
33568  [illegible]  = 978
33576  [illegible]  = 782
33584  [illegible]  = 155
33592  [illegible]  = 740
33600  [illegible]  = 713
33608  [illegible]  = 882
33616  [illegible]  = 772
33624  [illegible]  = 1243
33632  [illegible]  = 962
33640  [illegible]  = 1320
33648  [illegible]  = 1368
33656  [illegible]  = 987
33664  [illegible]  = 868
33672  [illegible]  = 469
33680  [illegible]  = 660
33688  [illegible]  = 759
33696  [illegible]  = 806
33704  [illegible]  = 925
33712  [illegible]  = 872
33720  [illegible]  = 760
33728  [illegible]  = 814
33736  [illegible]  = 866
33744  [illegible]  = 1037
33752  [illegible]  = 820
33760  [illegible]  = 1026
33768  [illegible]  = 563
33776  [illegible]  = 952
33784  [illegible]  = 1216
33792  [illegible]  = 1169?
33800  [illegible]  = 828
33808  [illegible]  = 845
33816  [illegible]  = 399
33824  [illegible]  = 764
33832  [illegible]  = 1144
33840  [illegible]  = 1153
33848  [illegible]  = 1008
33856  [illegible]  = 826
33864  [illegible]  = 1076
33872  [illegible]  = 784
33880  [illegible]  = 812
33888  [illegible]  = 1079
33896  [illegible]  = 408
33904  [illegible]  = 1556
33912  [illegible]  = 1142
33920  [illegible]  = 976
33928  [illegible]  = 850
33936  [illegible]  = 1072
33944  [illegible]  = 871
33952  [illegible]  = 728
33960  [illegible]  = 664
33968  [illegible]  = 473
33976  [illegible]  = 804
33984  [illegible]  = 1235
33992  [illegible]  = 686
34000  [illegible]  = 427
34008  [illegible]  = 1374
34016  [illegible]  = 396
34024  [illegible]  = 970
34032  [illegible]  = 862
34040  [illegible]  = 579
34048  [illegible]  = 924
34056  [illegible]  = 1041
34064  [illegible]  = 339
34072  [illegible]  = 871
34080  [illegible]  = 759
34088  [illegible]  = 1096
34096  [illegible]  = 975
34104  [illegible]  = 602
34112  [illegible]  = 616
34120  [illegible]  = 925
34128  [illegible]  = 809
34136  [illegible]  = 766
34144  [illegible]  = 1092
34152  [illegible]  = 937
34160  [illegible]  = 1057
34168  [illegible]  = 977
34176  [illegible]  = 560
34184  [illegible]  = 484
34192  [illegible]  = 802
34200  [illegible]  = 952
34208  [illegible]  = 677
34216  [illegible]  = 451?
34224  [illegible]  = 1021?
34232  [illegible]  = 1024?
34240  [illegible]  = 953
34248  [illegible]  = 635
34256  [illegible]  = 674
34264  [illegible]  = 559
34272  [illegible]  = 485
34280  [illegible]  = 803
34288  [illegible]  = 537
34296  00 = 0
```

Double height

M K Mostowyj
Bretton Estate,
Peterborough.

Amstrad

THIS IS A utility program for the Amstrad CPC-464. It will give you access to a double height character set similar to that found on the BBC micro. The program provides Basic with two new commands by using the RSX capability of the Amstrad. The two new commands are Top and Bat. Anyone familiar with the BBC will know that to print in double height in Mode 7 two lines must be used, e.g.:

10 PRINTTAB(1,10);CHR$(141),"This is an example"
20 PRINTTAB(1,11);CHR$(141),"This is an example"

The second line is printed one line lower than the first and CHR$(141) informs the BBC that double height is required. My version for the Amstrad works in a similar way. Any string that already exists in your Basic program can be printed in double height. The syntax is as follows.

1TOP,@a$ (This prints the top line as in line 10 above)
1BOT,@a$ (This prints the bottom line as in line 20)

The words Top and Bot must be preceded with the 1 symbol, this is the shifted @ key. Both words must then be followed directly by a comma and the @ symbol then the string to be printed, a$ is used in the example but in fact any string can be used as long as it exists. Also the top and bottom halves of the double height characters can have different Pen and Paper colours, e.g.:

10 X$="QWERTY"
20 LOCATE 1,10:PAPER 1:PEN 2:
1TOP,@X$
30 LOCATE 1,11:PAPER 2:PEN 3:
1BOT,@X$

Any character from 32 to 126 can be printed using this utility and it can be used in any mode. The only restriction is that the string to be printed must not exceed the screen width e.g. 80 characters in Mode 2, 40 in Mode 1 and 20 in Mode 0.

To enter the program simply type in listing 1 and run it. The data in line 250 is poked into memory first. This is not in fact part of the finished program but is a small machine code routine that transfers a copy of the original character set to a different part of memory thus saving you having to type in an extra 760 bits of data. Once this is completed the data containing the new character sets — one for the tops and one for the bottoms — and the machine code that supplies the two new commands is poked into memory. If all is well the new commands are logged on and a message is printed using the new facility.

To save the resulting code use

SAVE "D/H.BIN",B,38200,2371

To reload it either type as a direct command or as the first line of your own program

SYMBOL AFTER 0:MEMORY &9537:LOAD"!":CALL &9E20

```
10 '"******************************"
20 '"BASIC LOADER FOR DOUBLE HEIGHT"
30 '"          BY  M.K.MOSTOWYJ"
40 '"              MAY 1985"
50 '"******************************"
60 SYMBOL AFTER 0:MEMORY &9537
70 RESTORE 250
80 MODE 1:PRINT"PLEASE WAIT!!"
90 FOR A=&7530 TO &753B
100 READ X$:POKE A,VAL("&"+X$)
110 NEXT
120 CALL &7530
130 CH=0
140 FOR A=&9830 TO &9E7A
150 READ X$:POKE A,VAL("&"+X$)
160 CH=CH+VAL("&"+X$)
170 NEXT
180 IF CH<>96418 THEN CLS:PRINT"ERROR
IN DATA":END
190 CALL &9E20
200 CLS
210 A$="Routine now in memory and logg
ed on."
220 |TOP,@A$
230 |BOT,@A$
240 END
250 DATA 21,00,A5,11,38,95,01,F8,02,ED
,B0,C9
260 DATA 00,00,00,00,00,00,00,00,00,00
,18,18,18,18,18,18,00,00,66,66,66,66
270 DATA 00,00,00,00,36,36,7F,7F,36,36
,00,00,08,08,7E,7E,48,7E,00,00,00,71
280 DATA 53,76,0C,18,00,00,38,7C,6C,6C
,38,30,18,18,18,18,30,60,00,00,00,00
290 DATA 0C,18,30,30,60,60,00,00,30,18
,0C,0C,06,06,00,00,00,00,66,24,18,7E
300 DATA 00,00,00,00,18,18,18,7E,00,00
,00,00,00,00,00,00,00,00,00,00,00,00
310 DATA 00,7E,00,00,00,00,00,00,00,00
,00,00,00,01,03,06,0C,18,00,3D,7E,66
320 DATA 66,66,6E,6E,00,18,38,78,18,18
,18,18,00,3C,7E,66,66,06,06,0C,00,3C
330 DATA 7E,66,66,06,06,1C,00,0C,1C,1C
,3C,3C,6C,6C,00,7E,7E,60,60,60,7C,7E
340 DATA 00,3C,7E,66,60,60,7C,7E,00,7E
,7E,06,06,06,0C,18,00,3C,7E,66,66,66
350 DATA 7E,3C,00,3C,7E,66,66,66,66,66
,00,00,00,00,00,18,18,18,00,00,00
360 DATA 00,00,00,00,00,00,00,00,0C,18
,30,60,00,00,00,00,00,7E,7E,00,00,00
370 DATA 00,00,30,18,0C,06,00,3C,7E,66
,66,66,0C,18,00,00,3C,7E,42,5E,5E,5E
380 DATA 00,3C,7E,66,66,66,66,7E,00,7C
,7E,66,66,66,7E,7C,00,3C,7E,66,66,60
390 DATA 60,60,00,78,7C,6E,66,66,66,66
,00,7E,7E,60,60,60,60,7C,00,7E,7E,60
400 DATA 60,60,60,7C,00,3C,7E,66,66,60
,60,60,00,66,66,66,66,66,66,7E,00,3C
410 DATA 3C,18,18,18,18,18,00,06,06,06
,06,06,06,06,00,66,66,66,66,6C,78,78
420 DATA 00,60,60,60,60,60,60,60,00,66
,FF,DB,DB,DB,DB,DB,00,3C,7E,66,66,66
430 DATA 66,66,00,3C,7E,66,66,66,66,66
,00,7C,7E,66,66,66,66,66,00,3C,7E,66
440 DATA 66,66,66,66,00,7C,7E,66,66,66
,66,66,00,3C,7E,66,66,60,7C,3E,00,7E
450 DATA 7E,18,18,18,18,18,00,66,66,66
,66,66,66,66,00,66,66,66,66,66,66,66
460 DATA 00,DB,DB,DB,DB,DB,DB,DB,00,66
,66,66,66,66,7E,3C,00,66,66,66,66,66
470 DATA 7E,3C,00,7E,7E,06,06,0C,0C,18
,00,3C,3C,30,30,30,30,30,00,00,00,80
480 DATA C0,60,30,18,00,3C,3C,0C,0C,0C
,0C,0C,00,18,3C,7E,5A,18,18,18,00,00
490 DATA 00,00,00,00,00,00,00,30,30,18
,0C,00,00,00,00,00,00,00,00,00,00,78
500 DATA 00,00,00,E0,E0,60,60,7C,00,00
,00,00,00,00,00,3C,00,00,00,1C,0C,0C
510 DATA 0C,7C,00,00,00,00,00,00,00,3C
,00,00,00,1C,36,36,30,30,00,00,00,00
520 DATA 00,00,00,3E,00,00,00,E0,60,60
,60,6C,00,00,00,00,00,18,00,38,00,00
530 DATA 00,00,00,06,00,0E,00,00,00,E0
,60,60,60,66,00,00,00,38,18,18,18,18
540 DATA 00,00,00,00,00,00,00,6C,00,00
,00,00,00,00,00,DC,00,00,00,00,00,00
550 DATA 00,3C,00,00,00,00,00,00,00,DC
,00,00,00,00,00,00,00,76,00,00,00,00
560 DATA 00,00,00,6C,00,00,00,00,00,00
,00,3C,00,00,00,00,30,30,30,7C,30,00,00
570 DATA 00,00,00,00,00,00,66,00,00,00
,00,00,00,66,00,00,00,00,00,00,00,C6
580 DATA 00,00,00,00,00,00,00,C6,00,00
,00,00,00,00,00,66,00,00,00,00,00,00
590 DATA 00,7E,00,0E,0E,18,18,18,18,70
,00,18,18,18,18,18,18,18,00,70,70,18
600 DATA 18,18,18,0E,00,76,76,DB,DB,00
,00,00,00,00,00,00,00,00,00,00,18,18
610 DATA 18,18,00,18,18,00,00,00,00,00
,00,00,00,00,36,36,7F,7F,36,36,00,00
620 DATA 7E,0A,7E,7E,08,08,00,00,30,6E
,CA,8E,00,00,00,00,7B,FF,CC,CC,FF,7B
630 DATA 00,00,00,00,00,00,00,00,00,00
,60,60,30,30,18,0C,06,00,06,06,0C,0C
640 DATA 18,30,60,00,18,24,66,00,00,00
,00,00,7E,18,18,18,00,00,00,00,00,00
650 DATA 18,18,18,18,30,60,7E,00,00,00
,00,00,00,00,00,00,18,18,18,18,00,00
660 DATA 30,60,C0,80,00,00,00,00,76,76
,66,66,66,7E,BC,00,18,18,18,18,18,3C
670 DATA 3C,00,18,30,60,60,60,7E,7E,00
,1C,06,06,66,66,7E,3C,00,6C,6C,7E,7E
680 DATA 0C,0C,0C,00,06,06,06,66,66,7E
,3C,00,66,66,66,66,66,7E,3C,00,18,18
690 DATA 18,18,18,18,18,00,7E,66,66,66
,66,7E,3C,00,7E,3E,06,06,66,7E,3C,00
700 DATA 00,00,00,18,18,18,18,00,18,00
,18,18,18,18,30,60,60,30,18,0C,00,00
710 DATA 00,00,00,7E,7E,00,00,00,00,00
,06,0C,18,30,00,00,00,00,18,18,18,18
720 DATA 00,18,18,00,4E,40,40,40,40,7E
,3C,00,7E,66,66,66,66,66,66,00,66,66
730 DATA 66,66,66,7E,7C,00,60,60,60,66
,66,7E,3C,00,66,66,66,66,6E,7C,78,00
740 DATA 7C,60,60,60,60,7E,7E,00,7C,60
,60,60,60,60,60,00,6E,6E,66,66,66,7E
750 DATA 3C,00,7E,66,66,66,66,66,66,00
,18,18,18,18,18,3C,3C,00,06,06,06,66
760 DATA 66,7E,3C,00,7C,6E,66,66,66,66
```

(continued on next page)

(continued from previous page)

```
,66,00,60,60,60,60,60,7E,7E,00,DB,DB
770 DATA DB,DB,DB,DB,DB,00,66,66,66,66
,66,66,66,00,66,66,66,66,66,7E,3C,00
780 DATA 7E,7C,60,60,60,60,60,00,66,66
,66,6E,6E,7E,3F,03,7C,7E,66,66,66,66
790 DATA 66,00,06,06,06,66,66,7E,3C,00
,18,18,18,18,18,18,18,00,66,66,66,66
800 DATA 66,7E,3C,00,66,66,66,66,7E,3C
,18,00,DB,DB,DB,DB,FF,FF,66,00,3C,7E
810 DATA 66,66,66,66,66,00,18,18,18,18
,18,18,18,00,18,30,30,60,60,7E,7E,00
820 DATA 30,30,30,30,30,3C,3C,00,0C,06
,03,01,00,00,00,00,0C,0C,0C,0C,0C,3C
830 DATA 3C,00,18,18,18,18,18,18,18,00
,00,00,00,00,00,00,00,FF,00,00,00,00
840 DATA 00,00,00,00,0C,7C,CC,CC,CC,CC
,76,00,66,66,66,66,66,E6,BC,00,66,60
850 DATA 60,60,60,66,3C,00,CC,CC,CC,CC
,CC,CE,76,00,66,66,66,7E,60,60,3C,00
860 DATA 78,30,30,30,30,30,78,00,66,66
,66,66,66,3E,06,7C,76,66,66,66,66,66
870 DATA E6,00,18,18,18,18,18,18,3C,00
,06,06,06,06,06,66,66,3C,6C,6C,78,78
880 DATA 6C,6C,E6,00,18,18,18,18,18,18
,3C,00,FE,D6,D6,D6,D6,D6,00,66,66
890 DATA 66,66,66,66,66,00,66,66,66,66
,66,66,3C,00,66,66,66,66,66,7C,60,F0
900 DATA CC,CC,CC,CC,CC,7C,0C,1E,36,30
,30,30,30,30,78,00,60,60,3C,06,06,06
910 DATA 7C,00,30,30,30,30,36,36,1C,00
,66,66,66,66,66,66,3E,00,66,66,66,66
920 DATA 66,3C,18,00,D6,D6,D6,D6,D6,FE
,6C,00,6C,6C,38,38,6C,6C,C6,00,66,66
930 DATA 66,66,66,3E,06,7C,0C,0C,18,18
,30,32,7E,00,70,18,18,18,18,0E,0E,00
940 DATA 18,18,18,18,18,18,18,00,0E,18
,18,18,18,70,70,00,00,00,00,00,00,00
950 DATA 00,00,01,2E,9E,21,2A,9E,CD,D1
,BC,C9,00,00,2E,9E,36,9E,C3,3D,9E,C3
960 DATA 42,9E,54,4F,D0,42,4F,D4,00,21
,30,98,18,03,21,28,98,11,00,A5,01,F8
970 DATA 02,ED,B0,DD,6E,00,DD,66,01,7E
,FE,00,28,17,47,23,5E,23,56,EB,7E,CD
980 DATA 5A,BB,23,10,F9,3E,0D,CD,5A,BB
,3E,0A,CD,5A,BB,21,38,95,11,00,A5,01
990 DATA F8,02,ED,B0,C9
```

Securdrive

Ansgar Zerpass,
Lehrberg,
West Germany.

Spectrum

THE SPECTRUM Microdrive manual tells you how to save a program or a code or data file in a way that the usual Cat command cannot register it: Save the program or file with a file name starting with CHR$ 0.

This method will protect your programs on Microdrive cartridge from unauthorised access. On the other hand, you will have to learn the protected program names by heart — which will prove to be impossible — or you will have to keep a written list of the names along with your cartridges — which will make the whole protection senseless.

Securdrive is a utility which will store the file names of your protected programs and which allows you to get rid of a written list. Securdrive will be saved on Microdrive cartridge with the autorun facility (. . . Line 1) which makes it unable to break into Securdrive during the loading process or to merge it in order to get hold of the stored program names.

The first operation of Securdrive after loading is the input of a password. A wrong password will cause the system to crash. The right password will cause a list of all protected programs to be shown and will give you the opportunity to load any of these programs by pressing just one key.

Spectrum users should be able to alter Securdrive to handle more than 10 protected file names or to handle protected data files from a commercial file program etc. without much difficulties.

You may use Securdirve with your existing cartridges by saving all existing files and programs with a new, protected name (starting with CHR$ 0) and saving Securdrive on the same cartridge. You will have to initialise Securdrive by entering the protected file names and a password of your choice every time a new protected program has been saved on the cartridge.

Type in listing 1 and save it on any cartridge with

GO TO 9999

and

ENTER

Type in listing 2, the demo program, and enter

GO TO 100

to save this program on the same cartridge with three different names. Then new your computer and load Securdrive. Initialise the program by entering Init as password and entering the three protected demo program file names — DEMO ONE, DEMO TWO, DEMO XXX. Enter any new password and save Securdrive on the cartridge using option two.

Listing 1.

```
9000 REM
        { SECURDRIVE }
       ENGLISH VERSION
     ZX SPECTRUM & M-DRIVE
        © 04.05.1985 by
        Ansgar Zerfass,
       Schlehenweg 10,
       8802  Lehrberg,
        West Germany.
9010 CLEAR #: BORDER 1: PAPER 1:
 INK 7: CLS
9020 PRINT PAPER 5; INK 0;"{ SEC
URDRIVE }  © A.Zerfass 1985"
9030 INPUT PAPER 6; INK 0;"Enter
 the password to access theprote
cted programs or enter INITto en
ter a new list of protectedprogr
ams and a new password :  "; LI
NE I$
9040 IF I$="INIT" THEN GO TO 950
0
9050 IF I$<>C$ THEN PRINT USR 0
9060 PRINT AT 4,6;"Choice of pro
grams ''"
9070 FOR F=1 TO 10: IF N$(F)="
  " THEN GO TO 9090
9080 PRINT TAB 9;"(";F-(10 AND F
=10);")   ";N$(F): NEXT F
9090 PRINT AT 18,0;"Press the co
rresponding key toload a progr
am or press (C) tocopy the scr
een to your printer!": BEEP .1,1
9100 LET I=-1: LET I$=INKEY$: IF
 I$="" THEN GO TO 9100
9110 IF I$<"9" AND I$>="0" THEN
LET I=VAL I$+(10 AND I$="0")
9120 IF I>0 THEN IF N$(I)="
  " THEN LET I$="": GO TO 9100
9130 IF I$="C" OR I$="c" THEN CO
PY : LPRINT : LPRINT : LPRINT :
LET I$="": GO TO 9100
9140 IF I<1 THEN GO TO 9100
9150 PRINT #0;AT 1,6;"Loading ''
;N$(I);"''"
9160 LOAD *"M";1;CHR$ 0+N$(I): R
UN
9200 STOP
9500 CLEAR #: DIM N$(10,9): FOR
F=1 TO 10
9510 INPUT "ENTER THE PROGRAM NA
ME  (Max. 9letters; enter END i
f you haveentered all programs
) :          "; LINE M$: IF M$=""
 OR LEN M$>9 THEN GO TO 9510
9520 FOR G=1 TO F: IF N$(F, TO L
EN M$)=M$ THEN GO TO 9510
9530 NEXT G
9540 IF M$="END" THEN GO TO 9560
9550 LET N$(F)=M$: NEXT F
9560 INPUT "PASSWORD :   "; LINE
 C$: IF LEN C$>20 THEN GO TO 9560
9590 PRINT AT 3,0;"Press''''"(1)
 to save SECURDRIVE on a
 cartridge for the first time"''
"(2) to save SECURDRIVE on a
     cartridge after a"''     mod
ification"
9600 IF INKEY$="1" THEN GO TO 96
30
9610 IF INKEY$="2" THEN ERASE "M
";1;"SECURDRIVE": GO TO 9630
9620 GO TO 9600
9630 SAVE *"M";1;"SECURDRIVE" LI
NE 1: VERIFY *"M";1;"SECURDRIVE"
: CLS #: PRINT "SECURDRIVE saved
 and verified."''''"Password : ";
C$: PAUSE 0: PRINT USR 0
9999 CLEAR #: LET C$="INIT": SAV
E *"M";1;"SECURDRIVE" LINE 1
```

Listing 2. The demo program.

```
   1 REM ######################
         DEMO PROGRAM FOR SECUR-
         DRIVE / PRINTS CHAR-SET
         ######################
```

```
  10 BORDER 0: PAPER 0: INK 6: C
LS : PRINT N$''
  20 FOR f=32 TO 255: PRINT CHR$
f;: NEXT f
  30 GO TO 9999
 100 FOR F=1 TO 3: READ N$
 110 SAVE *"M";1;CHR$ 0+N$ LINE
1
 120 NEXT F
 130 DATA "DEMO ONE","DEMO TWO",
"DEMO XXX"
```

Fernando

David Cawthray,
Leeds.

BBC

YOU are Fernando the Flea hopping around a dog when suddenly you leap into a human's hair by mistake. The hair is all tangled and you have to leap from strand to strand searching for some precious objects. There are four levels and it is loosely based around a platform game.

Type in program 1, Run it and correct any mistakes. Save it then press Break, and enter program 2, Run it and correct any mistakes. Save it under "flea" then the two programs are ready. Rewind the cassette and chain program.

Program 1.

```
 110ONERROR CLS:GOTO150
 120REMTITLEPAGE
 130PROCINIT
 140MODE1:VDU23:8202:0:0:0:19,0,4:0:
 150COLOUR1
 160PROCCENTER("D.C.SOFT Presents",2)
 170COLOUR2
 180PROCCENTER("FERNANDO THE",5)
 190PROCCENTER("FLEA",7)
 200PRINTTAB(12,9)"By D.J.Cawthrav"
 210PRINTTAB(4,13)"Graphics"
 220PRINTTAB(7,14)"By"
 230PRINTTAB(3,15)"P.Cawthray"
 240PRINTTAB(27,13)"Music"
 250PRINTTAB(29,14)"By"
 260PRINTTAB(26,15)"S.Addy"
 270PROCKEY
 280PROCCENTER("FERNANDO THE FLEA",2)
 290PRINTTAB(2,5)"You play the part of
fernando flea"
 300PRINT"  Who is trapped in somebody'
s hair."
 310PRINT'"  Being a flea you can fall
any distance. But don't be too long on e
ach level or  your BOUNUS will reach zer
o and you     will lose a life."
 320PRINT'"  To get the gems you must g
et past the   monsters."
 330PRINT'"  There are four levels each
 has a        different monster.You must
 complete     all the levels to get out
of the        hair."
 340FORI=1TO1000:NEXT
 350PROCKEY
 360ON ERROR CLS:GOTO370
 370PROCCENTER("FERNANDO THE FLEA",2)
 380PRINTTAB(2,5)"Use the following key
s:-"
 390PROCCENTER("Z......Left",7)
 400PROCCENTER("X......Right",9)
 410PROCCENTER("Shift.....Jump",11)
 420VDU28,10,22,30,20
 430ONERRORGOTO440
 440CHAIN"FLEA"
 450END
 460DEFPROCCENTER(A$,Y)
 470X=20-(LEN(A$)/2)
 480PRINTTAB(X,Y)A$
 490PRINTTAB(X,Y+1);STRING$(LEN(A$),"~"
)
 500ENDPROC
 510DEFPROCINIT
 520VDU23,255,255,255,255,126,126,42,20
,0
 530VDU23,224,28,60,124,248,112,96,192,
224
 540VDU23,225,56,60,62,31,14,6,3,7
 550VDU23,226,42,85,16,16,28,16,24,60
 560VDU23,227,42,85,8,8,56,8,24,60
 570VDU23,228,24,60,126,255,255,126,60,
24
 580VDU23,229,0,29,17,29,5,29,0,0
 590VDU23,230,0,209,11,209,17,29,0,0
 600VDU23,231,0,220,72,200,72,72,0,0
 610VDU23,232,0,0,0,24,24,0,0,0
 620VDU23,233,0,0,36,0,0,36,0,0
 630VDU23,234,0,66,0,0,0,0,66,0
 640VDU23,235,129,0,0,0,0,0,0,129
 650VDU23,236,66,126,60,24,24,24,126,21
9
 660VDU23,237,62,126,254,62,62,62,12,28
 670VDU23,238,124,126,127,124,124,124,4
8,56
 680VDU23,239,102,153,60,24,24,36,66,23
1
 690VDU23,240,60,102,195,195,231,231,23
1,255
 700VDU23,241,24,24,24,126,126,102,126,
126
 710VDU23,242,0,255,231,195,195,231,255
,0
 720VDU23,243,255,66,255,255,126,60,24,
0
 730ENVELOPE1,1,100,127,100,1,1,1,100,-
3,-2,-1,100,0
 740ENVELOPE4,1,0,0,0,200,200,200,0,-1,
0,-80,80,0
 750ENDPROC
 760DEFPROCKEY
 770PROCCENTER("PRESS SPACE BAR",28)
 780REPEAT
 790RESTORE880
 800FORI=0TO39
 810READNO%,DU%
 820NO%=NO%-48
 830DU%=DU%+3
 840IF NO%=-48 THEN SOUND1,0,0,DU%:GOTO
880
 850IF INKEY(-99) THEN CLS:ENDPROC
 860SOUND1,4,NO%,DU%
 870SOUND1,0,0,0
 880NEXT
 890UNTILFALSE
 900DATA101,1,121,1,109,1,121,1,117,1,1
17,1,0,1
 910DATA101,1,117,1,109,1,117,1,121,1,0
,2
 920DATA101,1,121,1,109,1,121,1,117,1,1
17,1,0,1
 930DATA101,1,117,1,109,1,117,1,121,1,0
,2
 940DATA137,1,121,1,149,1,121,1,157,1,1
17,1,117,1
 950DATA157,1,117,1,149,1,117,1,137,1,1
21,1,121,1
```

Program 2.

```
  10*FX15
  20MODE1
  30PROCASS
  40PROCHALL
  50LEV%=1:SC%=0:LI%=3
  60PROCINIT
  70VDU23:8202:0:0:0:
  80ONERRORGOTO50
  90VDU19,1,2:0:
 100PROCHALLOFFAME
 110CLS
 120COLOUR1
 130PROCINIT
 140PROCSCREEN(LEV%)
 150PROCINIT
 160COLOUR2
 170TIME=60
 180TI%=300-INT(TIME/30)
 190IF TI%<0 THEN PROCCAUGHT
 200PROCMOVE:PROCMON:GOTO180
 210DEFFNCHAR(A%,B%)
 220?&71=A%:?&72=B%
 230CALLREC
 240C%=?&75
 250=C%
 260DEFPROCMOVE
 270PRINTTAB(X%,Y%)" "
 280PROCKEYS
 290IFFNCHAR(X%,Y%)=130 OR FNCHAR(X%,Y%
)=131 THEN PROCCAUGHT
 300PROCCHECK
 310IFFNCHAR(X%,Y%+1)<>159 THEN Y%=Y%+1
:FALL%=1:GOTO330
 320FALL%=0
 330PRINTTAB(X%,Y%)CHR$(FLEA%)
 340PROCSCORE
 350FORI%=1TO50
 360NEXTI%
 370ENDPROC
 380DEFPROCJUMP
 390IFINKEY(-98)THENPROCLEFT:ENDPROC
 400IFINKEY(-67)THENPROCRIGHT:ENDPROC
 410SOUND1,1,210,1
 420Y%=Y%-2:ENDPROC
 430DEFPROCLEFT
 440E%=0
 450FLEA%=225
 460RESTORE590
 470SOUND1,1,210,1
 480REPEAT
 490E%=E%+1
 500 IF E% MOD2=0 THEN PROCMON
 510PRINTTAB(X%,Y%)" "
 520READA%,B%
 530IFFNCHAR(X%+A%,Y%+B%)=159THEN UNTIL
TRUE:ENDPROC
 540IF X%+A%<0THENA%=0:UNTILTRUE:PROCCL
:ENDPROC
 550X%=X%+A%:Y%=Y%+B%
 560PRINTTAB(X%,Y%)CHR$(FLEA%)
 570FORI%=1TO50:NEXTI%
 580UNTILA%=-1 AND B%=1:PROCCL:ENDPROC
 590DATA-1,-1,-1,-1,-1,0,-1,0,-1,1,-1,1
 600DEFPROCRIGHT
 610E%=0
 620FLEA%=224
 630RESTORE760
 640SOUND1,1,210,1
 650REPEAT
 660E%=E%+1
 670 IF E% MOD2=0 THEN PROCMON
 680PRINTTAB(X%,Y%)" "
 690READA%,B%:IFA%=999 OR B%=999THEN750
 700IFFNCHAR(X%+A%,Y%+B%)=159THEN UNTIL
TRUE:ENDPROC
 710IFX%+A%>39THENX%=39:PROCCL:UNTILTRU
E:ENDPROC
 720X%=X%+A%:Y%=Y%+B%
 730PRINTTAB(X%,Y%)CHR$(FLEA%)
 740FORI%=1TO50:NEXTI%
 750UNTILA%=999 OR B%=999:PROCCL:ENDPRO
C
 760DATA1,-1,1,-1,1,0,1,0,1,1,1,1,999,9
99
 770DEFPROCSCREEN(LLEV%)
 780CLS
 790COLOUR1
 800IFLEV%=1 PRINTTAB(0,30)STRING$(40,C
HR$255):ELSE PRINTTAB(0,31)STRING$(40,CH
R$255):
 810PROCOBJECT
 820COLOUR1
 830ON LLEV% GOTO840,850,860,870
 840RESTORE940:GOTO880
 850RESTORE950:GOTO880
 860RESTORE960:GOTO880
 870RESTORE970
 880FORI%=1TO25
 890READX%,Y%,L%
 900PRINTTAB(X%,Y%):STRING$(L%,CHR$255)
 910NEXTI%
 920COLOUR2
 930ENDPROC
 940DATA31,3,7,37,5,1,5,7,21,29,7,4,37,
7,3,29,16,1,5,9,1,26,9,1,34,10,2,5,11,7,
14,11,2,17,12,7,26,14,1,10,16,18,29,18,2
,19,20,1,28,20,3,21,21,6,19,22,1,10,23,4
,19,24,1,10,25,1,14,25,3,18,26,2,7,27,6

 950DATA0,5,23,23,7,13,15,9,7,32,9,4,38
,11,2,38,13,2,33,14,3,38,15,2,38,17,2,16
,19,5,20,19,3,38,19,2,12,21,4,36,20,1,24
,22,4,34,22,5,14,23,5,30,24,5,20,25,4,5,
27,3,12,27,12,0,28,3,6,15,3,3,23,1,35,26
,1
 960DATA5,5,5,11,6,5,20,7,4,23,9,3,25,1
1,3,27,13,3,29,15,3,37,15,3,33,16,3,29,1
8,4,28,20,4,21,22,7,16,24,2,19,24,2,28,2
4,9,22,25,5,1,26,3,11,26,6,9,28,2,13,28,
2,16,28,5,10,16,1,16,16,1,35,3,1,30,28,1

 970DATA3,4,4,12,4,4,21,4,4,30,4,4,38,4
,2,35,6,2,17,8,1,35,8,2,35,10,2,14,11,1,
3,12,3,29,12,8,23,14,4,22,16,2,17,18,7,1
4,19,2,8,20,3,31,20,3,13,22,6,17,24,2,17
,26,2,28,18,1,26,25,3,18,28,8,18,30,8
 980DEFPROCCL:PRINTTAB(X%,Y%)" ":ENDPRO
C
 990DEFPROCMON
1000PRINTTAB(MONX%,MONY%)" "
1010PRINTTAB(MON2X%,MON2Y%)" "
1020MONX%=MONX%+DIRX%
1030MON2X%=MON2X%+DIR2X%
1040IF MONX%>MMB% THEN DIRX%=-DIRX%:MON
C%=MONCA%
1050IF MON2X%>MMB2% THEN DIR2X%=-DIR2X%
:MONC2%=MONCA%
1060IF MONX%<MMA% THEN DIRX%=-DIRX%:MON
C%=MONCB%
1070IF MON2X%<MMA2% THEN DIR2X%=-DIR2X%
:MONC2%=MONCB%
1080IFFNCHAR(MONX%,MONY%)=128 OR FNCHAR
(MONX%,MONY%)=129 THENPROCCAUGHT
1090IFFNCHAR(MON2X%,MON2Y%)=128 OR FNCH
AR(MON2X%,MON2Y%)=129 THENPROCCAUGHT
1100PRINTTAB(MONX%,MONY%)CHR$(MONC%)
1110PRINTTAB(MON2X%,MON2Y%)CHR$(MONC2%)
1120ENDPROC
1130DEFPROCINIT
1140IFLEV%=1 THEN RESTORE1190
1150IFLEV%=2 THEN RESTORE1200
1160IFLEV%=3 THEN RESTORE1210
1170IFLEV%=4 THEN RESTORE1220
1180READX%,Y%,MONX%,MONY%,MMA%,MMB%,MON
2X%,MON2Y%,MMA2%,MMB2%,O1%,O1Y%,OB%,MONC
A%,MONCB%
1190DATA1,28,11,15,11,26,31,2,32,36,31,
```

(continued on next page)

(continued from previous page)

```
1,228,227,226
 1200DATA1,29,30,23,31,33,16,18,17,21.1,
4,241,236,236
 1210DATA18,0,22.21,22.26.11,5,12,14,2,2
5,242,237,238
 1220DATA7,25,3,3,1,38,29,11,30,35,0,7,2
43,239,239
 1230DIRX%=1:DIR2X%=1:JUMP%=0:Q%=0:FALL%
=0:FLEA%=224:MONC2%=MONCB%:MONC%=MONCB%
 1240FALL%=0:FLEA%=224
 1250ENDPROC
 1260DEFPROCGOT
 1270REPEAT:TI%=TI%-10:SC%=SC%+10:SOUND1
,4,TI%,1:PROCSCORE:UNTILTI%<=0
 1280IF SC%>SCH%(1) THEN PROCENDGAME
 1290TI%=1:PROCSCORE
 1300FORI%=1TO2500:NEXTI%
 1310PROCCAN CAN
 1320LEV%=LEV%+1:IF LEV%=5 THEN PROCENDG
AME
 1330GOTO110
 1340ENDPROC
 1350DEFPROCASS
 1360DIMSPACE 90:P%=SPACE:OS=&FFEE
 1370FORI%=0TO2STEP2
 1380[OPTI%
 1390.REC
 1400LDA£31:JSR OS:LDA&71:JSR OS:LDA&72:
JSR OS
 1410LDA£135:JSR&FFF4:STX&75:AND&75:LDA&
75:STA&75DIV&100
 1420LDA£31:JSR OS:LDA£POS:JSR OS:LDA£VP
OS:JSR OS
 1430RTS:]:NEXT
 1440ENDPROC
 1450DEFPROCCAN_CAN
 1460RESTORE1610
 1470CLS
 1480*FX15
 1490*FX15
 1500PRINTTAB(3,5)"WELL DONE! NOW ON TO
THE NEXT LEVEL":
 1510COLOUR1
 1520PRINTTAB(0,20)STRING$(40.CHR$255)
 1530COLOUR2
 1540X%=-1:Y%=19
 1550PRINTTAB(X%,Y%)" "
 1560READ NO%,DU%
 1570IFNO%=999 OR DU%=999 THEN ENDPROC
 1580IFDU%=10 THEN DU%=8
 1590DU%=DU%-3
 1600 X%=X%+1:PRINTTAB(X%.Y%)CHR$(224):S
OUND1,-10,NO%,DU%:SOUND2,-10,NO%,DU%:SOU
ND3.-10,NO%,DU%:SOUND1,0.0,0:IF X%>40 TH
EN ENDPROC ELSE GOTO1550
 1610DATA101,10,109,5,121,5,117,5,109,5,
129,10,129,10,129,5,137,5,117,5,121,5,10
9,10,109,10.109,5,121,5,117.7,109,5,101,
5,149,5,145,5,137,5,129,5,121,5,117,5,10
9,5,101,10,109,5,121,5,117;5,109,5,129,1
0,129,10
 1620DATA101,5,129,5,109,5,117,5,101,10,
999,999
 1630DEFPROCSCORE
 1640PRINTTAB(0,0)"Score ":SC%
 1650PRINTTAB(11.0)"Lives ":LI%
 1660PRINTTAB(21.0)"Level ":LEV%
 1670PRINTTAB(0.1)"Bonus ":TI%:" "
 1680ENDPROC
 1690DEFPROCCAUGHT
 1700*FX15
 1710SOUND0.4,100,50
 1720D%=0
 1730REPEAT
 1740D%=D%+1
 1750FORI%=235 TO 232 STEP-1
 1760PRINTTAB(X%,Y%)CHR$(I%)
 1770FORZ=1TO100:NEXTZ.I%
 1780FORI%=232 TO 235
 1790PRINTTAB(X%,Y%)CHR$(I%)
 1800FORZ=1TO100:NEXTZ,I%
 1810UNTILD%=2
 1820PRINTTAB(X%,Y%)CHR$240
 1830COLOUR3
 1840PRINTTAB(X%-1,Y%-1)CHR$229;CHR$230;
CHR$231
 1850FORI%=1TO5000:NEXTI%
 1860PRINTTAB(X%-1,Y%-1)"   "
 1870PRINTTAB(X%.Y%)" "
 1880X%=1:Y%=26
 1890TIME=60
 1900COLOUR2:LI%=LI%-1:IF LI%<1 THEN PRO
CDEAD ELSE IF LEV%<>4 PROCSCREEN(LEV%):E
NDPROC
 1910TIME=60
 1920ENDPROC
 1930DEFPROCOBJECT
 1940COLOUR3
 1950PRINTTAB(O1%,O1Y%)CHR$(OB%)
 1960COLOUR3
 1970ENDPROC
 1980DEFPROCCHECK
 1990IF X%=O1% AND Y%=O1Y% THEN SC%=SC%+
10:PROCSCORE:PROCGOT
 2000ENDPROC
 2010DEFPROCHALL
 2020RESTORE2110
 2030DIMSCH%(10),SC$(10)
 2040FORI%=1TO10
 2050READ SCH%(I%)
 2060NEXTI%
 2070FORI%=1TO10
 2080READ SC$(I%)
 2090NEXTI%
 2100ENDPROC
 2110DATA1020,1000,900,800,700.600.500,4
00,300,200
 2120DATA David,Ian,Paul,Sharon,Alison.V
ijay,Jason,Colin,Margaret,Banjan
 2130DEFPROCHALLOFFAME
 2140CLS
 2150COLOUR2
 2160PRINTTAB(13.5)"HALL OF FAME"
 2170PRINTTAB(13,6)"---- -- ----"
 2180COLOUR1
 2190FORI%=1TO10
 2200COLOUR3
 2210PRINTTAB(10.I%+9);I%
 2220COLOUR1
 2230PRINTTAB(13.I%+9);SC$(I%)
 2240PRINTTAB(25.I%+9);SCH%(I%)
 2250NEXT
 2260PROCSPACE
 2270COLOUR3
 2280ENDPROC
 2290DEFPROCDEAD
 2300RESTORE2330:FORI%=1TO29:READCH%,EN%
,PC%,DU%
 2310SOUNDCH%.EN%.PC%.DU%
 2320NEXT:FORI=1TO4000:NEXT
 2330 DATA&0201,-10,81,16,&0202.-10,65,3
5,&0203,-10,53,35.1,0,0,1,1,-10,81,12,1,
0,0,1,1,-10,81,4,1,0,0,1
 2340DATA&0201,-10,81,16,&0202,-10.61,35
,&0203,-10,45,35,1,0,0,1,1,-10,93,12,1,0
,0,1,1,-10,89,4,1,0,0,1
 2350DATA&0201,-10,89,8,&0202,-10,81,36.
&0203,-10,65,36,1,0,0,1,1,-10,81,8,1,0,0
,1,1,-10,81,12,1,0,0,1,1,-10,77,4,1,0,0,1
 2360DATA&0201,-10,81,32,&0202,-10,61,32
,&0203,-10,45,32
 2370CLS
 2380COLOUR3
 2390PRINTTAB(10,2)"FERNANDO THE FLEA"
 2400PRINTTAB(5,5)"YOU ARE DEAD BUT YOU
SCORED ";SC%;"."
 2410IFSC%>SCH%(10) THENPRINTTAB(1,7)"TH
IS SCORE PUTS YOU IN THE HIGH SCORE
                TABLE.";:PROCENTER
 2420*FX15
 2430PRINTTAB(14,25)"PRESS ANY KEY"
 2440A%=GET
 2450LI%=3:SC%=0:LEV%=1
 2460GOTO100
 2470ENDPROC
 2480DEFPROCENTER
 2490*FX15
 2500INPUTTAB(1,9)"ENTER YOUR NAME (MAXI
MUM OF 10 CHARS) ";NAM$
 2510IF LEN(NAM$)>10 THEN PRINTTAB(5,9)S
PC(100):GOTO2500
 2520FORI%=1TO10
 2530IFSC%>SCH%(I%) THEN P%=I%:I%=10
 2540NEXTI%
 2550FORR%=10 TO P%+1 STEP-1
 2560SCH%(R%)=SCH%(R%-1):SC$(R%)=SC$(R%-
1)
 2570NEXT
 2580SCH%(P%)=SC%:SC$(P%)=NAM$
 2590NAM$=""
 2600ENDPROC
 2610DEFPROCKEYS
 2620IF INKEY(-98) AND JUMP%=0 AND FALL%
=0 AND X%>0 THEN X%=X%-1:FLEA%=225
 2630IF INKEY(-67) AND JUMP%=0 AND FALL%
=0 AND X%<39 THEN X%=X%+1:FLEA%=224
 2640IF INKEY(-1) AND JUMP%=0 AND FALL%=
0 THEN PROCJUMP
 2650ENDPROC
 2660DEFPROCSPACE
 2670PRINTTAB(14.25)"PRESS SPACE"
 2680IF INKEY(-99) THEN ENDPROC
 2690GOTO2680
 2700ENDPROC
 2710DEFPROCENDGAME
 2720CLS
 2730VDU19.0,4;0;
 2740PRINTTAB(2,5)"Well done you have co
mpleated all the   levels.";:IF SC%>SCH%
(10) THEN PRINT;"Which means you are in
the top   ten.";:PROCENTER
 2750*FX15
 2760PRINTTAB(10.24)"PRESS SPACE"
 2770REPEAT
 2780KEY%=GET
 2790UNTIL KEY%=32
 2800SC%=0:VDU19,0,0;0;
 2810GOTO50
```

Gardener

R Williams,
Deganwy,
Gwynedd.

Vic 20

IN GARDENER you are the man at the bottom of the screen with a bucket on your head. To your left is a dripping tap and to your right a ladder which leads to four levels, each with a sunflower on it.

Program 1.

```
READY.
10 POKE36879,25:PRINTCHR$(14);CHR$(8)
20 PRINT"[illegible]ETTING UP CHARS.","[illegible]AND \.-.",,"[illegible]LEASE OAIT...."
30 POKE56,27:FORI=6913TO7614:READJ:POKEI,J:NEXT:LOAD"",1,1
40 DATA32,110,29,160,0,132,253,132,10,165,0,133,254,165,1,133,255,165,197,201,12
,240,16
50 DATA201,36,240,52,201,20,240,100,201,21,208,3,76,176,27,96,32,50,29,162,44,32
,8,29
60 DATA169,22,209,254,240,3,76,253,27,145,0,169,3,145,2,169,18,145,254,162,6,32,
34,29
70 DATA162,22,32,23,29,76,98,29,32,50,29,162,22,32,23,29
80 DATA138,209,254,240,3,76,253,27,162,44,32,8,29,169,22,145,254,162,3,32,34,29,
162,22
90 DATA32,23,29,169,18,145,254,162,6,32,34,29,162,22,32,23,29,76,98,29
100 DATA32,66,29,162,21,32,23,29,169,32,209,254,240,107,145,0,162,43
110 DATA32,8,29,169,32,145,254,198,254,169,18,145,254,162,6,32,34,29,162,22,32,2
3,29,76
120 DATA98,29,32,82,29,162,23,32,23,29,177,254,201,32,240,63
130 DATA202,32,8,29,177,254,201,24,208,4,230,10,16,49,169,32,145,0,232,32,8,29,1
69,32
140 DATA145,254,230,254,169,18,145,254,162,6,32,34,29,162,22,32,23,29,76,98,29
150 DATA169,3,145,2,165,254,133,0,133,2,165,255,133,1,73,136,133,3,165,0,133,254
,165,1
160 DATA133,255,165,6,240,69,165,10,240,65,162,22,32,8,29,169,17,145,254,198,10,
198
170 DATA6,169,66,141,148,28,141,149,28,169,170,141,11,144
180 DATA160,1,162,255,142,11,144,32,150,239,32,150,239,202,208,244,136
190 DATA208,239,169,18,145,254,200,169,25,145,254,162,22,32,8,29,169,29,145,254,
230
```

The object of the game is to stop the flowers wilting, and therefore dying, by catching the water and pouring it on the flowers which will suddenly perk up. For each bucket of water poured on a flower you score five points. You start with three lives and there is a bonus life at 80 points. The keys to control the man are:

UP — I
DOWN — M
LEFT — J
RIGHT/POUR — L

Written in 2 parts

The program is written in two parts so as to fit in 3.5K. The first part lowers the ramtop to decimal 6912 and loads in the machine code to move the man, and the user-defined graphic characters. Great care should be taken here as no error traps could be included due to memory limitations — so type with care!! The first part when saved, automatically loads the second part, when run. Below is a description of the second part of the program.

Lines 10-20: Waits for a keypress on first run then sets up the variables.

```
200 DATA253,165,251,10,10,9,128,141,12,144,96
205 REM*** CHAR.DATA ***
210 DATA0,0,0,255,255,0,0,0,0,56,16,252,252,12,12,0
220 DATA90,90,60,24,24,84,34,2,90,90,60,24,24,40,68,72,90,90,60,24,24,20,34,18
230 DATA90,90,60,24,24,42,68,64,0,0,16,32,64,32,95,78,0,0,0,66,66,66,126,0
240 DATA0,2,134,0,71,119,0,0,90,90,60,24,24,36,36,36,16,16,56,124,124,124,56,16
250 DATA66,66,126,66,66,66,126,66,0,238,238,0,119,119,0,0,255,255,126,126,126,12
6,60,60
260 DATA8,8,8,137,74,42,44,28,8,8,4,4,4,8,107,156,0,0,32,80,200,200,8,28
270 DATA0,0,0,0,0,0,24,44,0,0,0,28,34,42,34,28,0,0,0,0,24,44,36,24,0,0,0,0,0,0
,0
280 DATA0,0,0,0,0,0,0,0
290 DATA138,133,252,56,165,254,229,252,133,254,176,2,198,255,96
300 DATA24,138,101,254,133,254,144,2,230,255,96
310 DATA165,255,73,136,133,255,138,145,254,165,255,73,136,133,255,96
320 DATA165,251,201,15,240,5,169,15,133,251,96,169,14,133,251,96
330 DATA165,251,201,16,240,5,169,16,133,251,96,169,15,133,251,96
340 DATA165,251,201,13,240,5,169,13,133,251,96,169,14,133,251,96
350 DATA165,251,145,254,162,0,32,34,29,76,235,27
360 DATA173,4,31,201,32,208,13,169,22,141,4,31,141,238,30,169,3,141,238,150
370 DATA173,114,31,201,32,208,13,169,22,141,114,31,141,92,31,169,3,141,92,151
380 DATA173,150,30,201,32,208,13,169,22,141,150,30,141,128,30,169,3,141,128,150,
173,202
390 DATA31,201,32,208,13,169,22,141,202,31,141,224,31,169,3,141,202,151,96

READY.
```

Program 2.

```
READY.

10 H=0:P(0)=7810:P(1)=7920:P(2)=8030:P(3)=8140:PRINT"████████████HIT A KEY":WAIT1
97,15
20 C=30720:N=36876:T=1000:S=0:L=3:G=1:D=8035:POKEN-7,255:POKEN+2,15:POKEN+3,25
30 PRINT"████████████████████KKL":POKE0,216:POKE2,216:POKE1,31:POKE3,151
40 FORI=8164TO8185:POKEI,23:POKEI+C,2:NEXT
50 FORI=0TO2:POKE7853+I,23:POKE7853+I+C,2:POKE7963+I,23:POKE7963+I+C,2
60 POKE8073+I,23:POKE8073+I+C,2:NEXT
70 FORI=7808TO8160STEP22:POKEI,22:POKEI+C,3:NEXT:POKE8152,20:POKE8152+C,0:POKE81
30,18
80 FORI=0TO3:POKEP(I),25:POKEP(I)+C,5:POKEP(I)+22,24:POKEP(I)+22+C,0:POKEP(I)-22
,29
90 POKEP(I)+C-22,7:NEXT:POKE8167,19:POKE8130+C,6
100 J=INT(RND(2)*4):IFPEEK(P(J))=28ANDRND(2)<.06THEN190
110 IFRND(1)<.07ANDPEEK(P(J))<>28THENPOKEP(J),PEEK(P(J))+1:POKEP(J)-22,PEEK(P(J)
-22)+1
120 PRINT"███SC:"S,"HI:"H,"██"LEFT$("TTTT",L):SYS6913:FORI=1TO70-S/4:NEXT
130 IFPEEK(253)<>0THENS=S+5:POKE253,0:IFH<STHENH=S
140 IFS=80THENL=L+G:G=0
150 IFPEEK(D)>18THENPOKED,32:D=D+22:IFD=8167THEND=8035:POKEN,200
160 IFPEEK(D)<19THENPOKE6,1:POKE7316,126:POKE7317,126:D=8035:GOTO190
170 POKED,21:POKED+C,6
180 POKEN,0:GOTO100
190 FORI=1TO1000:NEXT:FORI=248TO128STEP-10:POKEN-1,I:FORJ=1TO70:NEXTJ,I
200 FORI=1TOT:NEXT:POKEN-1,0:L=L-1:IFLTHENFORI=1TO2*T:NEXT:GOTO30
210 PRINT"██████████ANOTHER GO(Y/N)":I=PEEK(197):IFI=28THENPOKE198,0:SYS212
220 IFI<>11THEN210
230 FORI=1TO4*T:NEXT:POKE7316,66:POKE7317,66:POKE6,0:GOTO20

READY.
```

Lines 30-90:	Sets up the screen — ladder, floors, flowers. Also the man's starting position.
Lines 100-110:	Picks the number of the flower to be wilted — if any. If a flower has wilted too far then exit to line 200.
Line 120:	Prints "score", "high", "lives"; calls the machine code to move the man; delays depending on the score.
Line 130:	If Peek (253) had been set during the machine code then five points are added to the score and the high score checked for.
Line 140:	If the score is 80, then a bonus life is given.
Lines 150-180:	Moves the drop down the screen and "fills" the man's bucket if he catches it.
Lines 190-200:	Makes a noise, takes a life away. If there are enough lives left then program goes to line 30.
Lines 210-230:	Asks if user wants another go. If Yes then program moves to line 20. If No then SYS212, which resets the machine as if a RUN/STOP-RESTORE had been performed.

After typing in the second part it should be saved by typing

SAVE"",1,1

The first program will automatically run the second after it has loaded it.

Jon the Jany

N Billiland,
Grangemouth,
Stirlingshire.

Spectrum

JON the Jany is a ladders and platform game. You play the part of Jon whose sole purpose in life is to switch off light bulbs. To do this you must walk under them. Once you have switched off all the lights you get a different screen to complete and two extra lights to switch off. Sounds easy but as usual there are monsters that kill if they are touched.

Jon the Jany is written in Basic and machine code. The machine code controls the monsters and the rest is in Basic. The screens, bulbs and monsters are all printed up randomly and the cursors control Jon.

. Do not break into the program when scrolling message appears at the bottom of the screen because

POKE 23659,0

is used to print the message on the 22nd line and the program will crash if attempting to do so. If you can't be be bothered to type in this great program send a sae and £1.50 to N. Billiland, 22 Garry Place, Grangemouth, Stirlingshire.

```
  10 CLEAR 33499: BORDER 0: PAPE
R 0: OVER 0: INK 6: INK 8: CLS
: LET HI=0: GO SUB 5000: GO TO 45
00
  30 GO SUB 1500
  35 GO SUB 1000: GO SUB 2000: G
O SUB 3500
 100 REM MAIN ROUTINE
 110 IF INKEY$<>"" THEN BEEP .00
1,20
 115 LET X1=X: LET Y1=Y: IF ATTR
 (Y+2,X+1)=2 THEN GO TO 130
 120 IF ATTR (Y+2,X)=7 THEN GO T
O 200
 130 LET X=X+(INKEY$="8" AND X<3
1)-(INKEY$="5" AND X>0)
 200 LET Y=Y+(INKEY$="6" AND ATT
R (Y+2,X)=7)-(INKEY$="7" AND ATT
R (Y,X)=7)
 205 OVER 1: PRINT AT Y1,X1;A$(A
,1);AT Y1+1,X1;A$(A,2): IF A=3 T
HEN LET A=2: GO TO 300
 220 IF A=1 THEN LET A=2: GO TO
300
 230 IF INKEY$="8" THEN LET A=3
 240 IF INKEY$="5" THEN LET A=1
 300 PRINT AT Y,X;A$(A,1);AT Y+1
,X;A$(A,2): OVER 0: IF ATTR (Y-1
,X)=71 THEN PRINT AT Y-1,X; INK
1;"J": BEEP .01,T: LET T=T+1: LE
T S=S+10: PRINT AT 0,6;S: IF T=N
 THEN GO TO 3000
 320 IF ATTR (Y+1,X)=4 OR ATTR (
Y+1,X+1)=4 OR ATTR (Y+1,X-1)=4 O
R ATTR (Y,X)=4 THEN GO SUB 4000
 400 RANDOMIZE USR 33500: GO TO
110
1000 REM SCREEN
1010 PRINT AT 0,0; INK 7;"SCORE
";S;AT 0,12;"HI SCORE ";HI;AT 0,
27;"MEN ";LV;AT 21,0;"SCREEN ";S
CR: FOR F=4 TO 20 STEP 4: PRINT
AT F,0; INK 2;"AAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAA": IF F=20 THEN G
O TO 1110
1050 FOR G=1 TO 3
1060 LET C=INT (RND*30)+1: IF AT
TR (F,C+1)=7 OR ATTR (F,C-1)=7 T
HEN GO TO 1060
1090 FOR H=-1 TO 3: PRINT AT F+H
,C; INK 7;"B": NEXT H: NEXT G: N
EXT F
1110 IF ATTR (15,0)<>7 AND ATTR
(15,2)<>7 THEN FOR F=15 TO 19: P
RINT AT F,1; INK 7;"B": NEXT F:
RETURN
1500 REM VARIABLES
1510 DIM A$(3,2): LET A$(1,1)="H
": LET A$(1,2)="I": LET A$(2,1)=
"E": LET A$(2,2)="F": LET A$(3,1
)="C": LET A$(3,2)="D"
1570 LET N=5: LET S=0: LET T=0:
LET SCR=1: LET LV=4: LET B$="PRE
SS ANY KEY TO START..........."
1650 LET X=0: LET Y=18: LET A=2:
 PRINT AT Y,X;A$(A,1);AT Y+1,X;A
$(A,2): RETURN
2000 REM LIGHT BULBS
2010 FOR F=1 TO N
2020 LET Y1=(INT (RND*4)+1)*4+1:
 LET X1=INT (RND*32): IF ATTR (Y
1,X1)<>6 THEN GO TO 2020
2050 PRINT AT Y1,X1; INK 7; BRIG
HT 1;"J": NEXT F: RETURN
2500 REM SCROLLING MESSAGE
2510 POKE 23659,0: LET B$=B$(2 T
O )+B$(1): PRINT AT 22,0; INK 7;
 BRIGHT 1;B$( TO 32): BEEP .001
,INT (RND*50)+10: IF INKEY$="" T
HEN GO TO 2500
2515 PRINT AT 22,0;"
                    ": POKE 2365
9,2
2520 RETURN
3000 REM COMPLETED SCREEN
3010 FOR F=1 TO 10: BEEP .01,40+
F: NEXT F: FOR F=10 TO -20 STEP
-.7: BEEP .01,40+F: NEXT F: PRIN
T AT 21,0: POKE 23692,23: FOR F=
0 TO 21: PRINT : BEEP .005,10+(F
*2): NEXT F
3026 INK 7: PRINT AT 8,6;"YOU AC
TUALLY CLEARED";AT 10,10; BRIGHT
 1;"S C R E E N";AT 4,14; FLASH
1;"WOW";AT 6,12; INVERSE 1;"AMAZ
ING"
3032 PRINT AT 14,13; FLASH 1;SCR
;AT 14,17;SCR;AT 16,15;SCR;AT 12
,15;SCR;AT 14,15; INVERSE 1;SCR
3040 GO SUB 2500: PAPER 7: CLS :
 PAPER 0: INK 6: INK 8: CLS : LE
T SCR=SCR+1: LET N=N+2: LET T=0:
 GO SUB 1650: GO TO 35
3500 REM DATA FOR M/CODE
3530 LET P=33828: FOR F=1 TO 5:
POKE P,(INT (RND*30)+1)+(INT (RN
D*2)*128+96): POKE P+1,64+INT (R
ND*2)*8: POKE P+2,INT (RND*2)+1
: POKE P+3,4: LET P=P+4: NEXT F
3540 POKE P,255: POKE P+1,255: P
OKE 33827,1: RANDOMIZE USR 33500
: POKE 33827,0: RETURN
4000 REM "JS" LIFE
4010 OVER 1: BRIGHT 8: PRINT AT
Y,X;A$(A,1);AT Y+1,X;A$(A,2): FO
R F=Y+2 TO 20 STEP 1: PRINT AT F
,X;"E";AT F+1,X;"F": BEEP .005,F
: PRINT AT F,X;"E";AT F+1,X;"F":
 NEXT F
4110 OVER 0: GO SUB 1650: LET LV
=LV-1: IF LV<>0 THEN PRINT AT 0,
31;LV: GO SUB 2500: RETURN
4120 BEEP 1,-20: IF S>HI THEN PR
INT AT 10,10; FLASH 1; INK 7;"NE
W HI SCORE": FOR F=-20 TO 20: BE
EP .01,F: NEXT F: PRINT AT 12,11
; INK 7;"WELL DONE": PAUSE 0: P
AUSE 100: LET HI=S
4130 FOR F=50 TO 0 STEP -2: BEEP
 .01,F: NEXT F: CLS : PRINT AT 6
```

(continued on next page)

(continued from previous page)

```
,4; INK 7;"YOUR FINAL SCORE WAS
";S: PRINT AT 9,3; FLASH 1; INK
7;"DO YOU WANT ANOTHER GAME ?":
GO SUB 2500
4140 IF INKEY$="y" OR INKEY$="Y"
 THEN CLS : GO TO 30
4150 IF INKEY$="n" OR INKEY$="N"
 THEN GO TO 4500
4160 GO TO 4130
4500 REM OPENING SCREEN
4510 LET B$="
          'JON THE JANY' by NG
          GUIDE 'JON' AROUND TH
E FACTORY (using the cursors) SW
ITCHING OFF ALL THE LIGHTS
          BUT WATCH OUT FOR THE
FUNNY BLOBS              THEY
ARE FATAL IF TOUCHED  (press any
 key to play)"
4520 CLS : PRINT AT 6,6; INK 5;
BRIGHT 1;"J O N  T H E  J A N Y"
;AT 10,9; INK 7;"Written by N.G.
"
4530 GO SUB 2500: FOR F=0 TO 30:
 BEEP .01,F: NEXT F: PAPER 7: CL
S : PAPER 0: CLS : GO TO 30
5000 REM DATA
5005 PRINT AT 10,6; INK 7;"PLEAS
E WAIT A MINUTE"
5010 RESTORE 5080: FOR F=USR "A"
 TO USR "J"+7: READ A: POKE F,A:
 NEXT F
5020 RESTORE 9000: FOR F=33500 T
O 33829: READ A: POKE F,A: NEXT
F: RETURN
5080 DATA 255,24,24,255,255,129,
129,255
5090 DATA 129,129,129,255,255,12
9,129,129
5100 DATA 28,28,28,9,29,45,75,72
,72,20,148,84,82,34,2,3
5110 DATA 28,28,28,8,28,42,42,42
,42,20,20,20,20,20,20,54
5120 DATA 60,126,90,90,126,102,1
02,60
5130 DATA 56,56,56,144,184,180,2
10,18,18,40,41,42,74,68,64,192
5140 DATA 24,24,60,60,60,24,0,0
5160 GO TO 4130
9000 DATA 17,36,132,26,254,255,4
0,5,205,241,130,24,246,19,26,254
,255,200,27,24
9010 DATA 243,26,111,19,26,103,1
9,205,143,131,205,108,131,19,229
,205,126,131,26,254
9020 DATA 4,32,2,62,7,119,225,58
,35,132,167,40,2,19,201,213,27,2
05,45,131
9030 DATA 27,124,18,27,125,18,20
9,229,205,126,131,126,18,54,4,22
5,205,108,131,19
9040 DATA 201,26,203,71,32,13,20
3,79,32,11,203,87,32,9,203,95,32
,26,201,43
9050 DATA 201,35,201,213,125,230
,224,40,8,167,17,32,0,237,82,209
,201,17,32,7
9060 DATA 237,82,209,201,213,125
,230,224,254,224,40,6,17,32,0,25
,209,201,17,32
9070 DATA 7,25,209,201,229,213,1
7,136,255,6,8,78,26,169,119,36,1
9,16,248,209
9080 DATA 225,201,124,203,183,20
3,63,203,63,203,63,103,213,17,0,
88,25,209,201,125
9090 DATA 230,31,254,31,32,6,62,
0,203,199,18,201,167,32,6,62,0,2
03,207,18
9100 DATA 201,229,205,67,131,205
,126,131,126,254,6,225,32,17,229
,205,88,131,205,126
9110 DATA 131,126,254,2,225,40,4
,205,223,131,201,229,205,67,131,
205,126,131,126,254
9120 DATA 5,225,200,229,205,88,1
31,205,126,131,126,254,2,225,192
,205,240,131,201,205
9130 DATA 17,132,230,3,40,249,25
4,1,32,23,62,0,203,223,18,201,20
5,17,132,230
9140 DATA 3,40,249,254,1,32,6,62
,0,203,215,18,201,254,2,32,6,62,
0,203
9150 DATA 199,18,201,62,0,203,20
7,18,201,229,42,33,132,35,126,71
,230,63,103,34
9160 DATA 33,132,120,225,201,0,0
,0,255,255
```

Outlaw

Chris Colley,
Cambridge,
Cambridgeshire.

ZX-81

THE IDEA is to get from your hideout at the bottom of the screen to the castle at the top, steal some gold and return with it to your hideout. In between, you have to negotiate the changing doorways in the outer walls and avoid the patrolling guard. You have to make the trip 12 times in all and each time the game gets slightly faster.

You may wait in a doorway for a passage to clear and in this time you may find the gap changes and a wall is built on top of you. You may use this to your advantage since, when you move, there will be two gaps in that wall until the next change. Be careful not to forget your position while you're hidden though.

To enter the program you will need a Rem of 1304 bytes.

Enter the code, delete the hexloader, enter the Basic from program 1 and run. And there it is. The machine code may be stopped at any time by pressing shift with P, 0, Newline or Space. If the game is too fast, the speed may be changed by Poking 17480. This is initially set at 16 and the delay is caused by the computer counting up to

(PEEK 17480 — SCORE) x 256

Therefore, a number lower than 16 makes the game virtually unplayable in the later stage, while a number higher than about 30 makes it tediously slow in the early stages. If you require a challenge, cut your number of lives by Poking 17435 with the number of lives you require.

The hex loader.

```
  1 REM HEXLOADER FOR OUTLAW
 10 PRINT "START ADDRESS"
 20 INPUT S
 30 PRINT "FINISH ADDRESS"
 40 INPUT F
 50 FOR N=S TO F STEP 8
 60 LET T=0
 70 PRINT N;" - ";
 80 INPUT A$
 90 PRINT A$;" = ";
100 INPUT TOT
110 PRINT TOT
120 LET Z=0
130 FOR K=1 TO LEN A$ STEP 2
140 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
150 LET T=T+C
160 POKE N+Z,C
170 LET Z=Z+1
180 NEXT K
190 IF TOT=T THEN GOTO 220
200 PRINT "ERROR - PLEASE INPUT
AGAIN"
210 GOTO 60
220 NEXT N
```

The Basic program.

```
  1 LET HI=0
  5 FAST
 10 CLS
 20 POKE 16418,0
 30 PRINT "     ███ █ █ ███ █
███ █  █"
 40 PRINT "     █ █ █ █  █  █
█ █ █  █"
 50 PRINT "    █ █ █ █  █  █
███ █  █"
 60 PRINT "    █ █ █ █  █  █
█ █ ███"
 70 PRINT "   ███ ███  █  ███ █
█ ████"
 80 LET Z=PEEK 16396+256*PEEK 1
6397
 90 POKE Z+1,200
100 POKE Z+67,200
110 POKE Z+133,200
120 PRINT ,,"
130 PRINT "
140 PRINT "
150 FOR A=9 TO 20
160 PRINT AT A,0;"███";AT A,29;
"███"
170 NEXT A
180 PRINT "        PRESS A KE
"
190 PRINT "
200 PRINT "
"
210 GOSUB 250
220 PRINT AT 10,11;"1   INFO";A
T 13,11;"2   KEYS";AT 16,11;"3
PLAY";AT 19,11;"4   QUIT"
225 SLOW
230 GOTO 230+70*(INKEY$="1")+17
0*(INKEY$="2")+270*(INKEY$="3")+
60*(INKEY$="4")
240 GOTO 230
250 FOR A=9 TO 20
260 PRINT AT A,3;"
"
270 NEXT A
280 RETURN
290 STOP
300 GOSUB 250
310 PRINT AT 10,4;"YOUR TASK IS
 TO ROB THE";TAB 11;",";TAB 4;"S
HERIFF S GOLD AND TAKE";TAB 5;TA
B 4;"IT TO YOUR HIDEOUT IN";TAB
5;TAB 4;"THE WOODS.THE PACE HOTS
";TAB 5;TAB 4;"UP EACH TIME YOU
SUCCEED."
320 IF INKEY$="" THEN GOTO 320
330 GOSUB 250
340 PRINT AT 10,4;"THE PASSAGES
 ARE GUARDED";TAB 5;TAB 4;"SO ST
AY ON YOUR TOES.YOU";TAB 5;TAB 4
;"HAVE 10 LIVES AND MUST";TAB 5;
TAB 4;"MAKE 12 TRIPS IN ALL.";TA
B 5;TAB 4;"GOOD LUCK"
350 IF INKEY$="" THEN GOTO 350
360 GOTO 210
400 GOSUB 250
410 PRINT AT 10,15;"UP";TAB 11;
"1234567890";TAB 9;TAB 8;"  QWER
T  YUIOP  ";TAB 9;TAB 8;"  ASDFG
 HJKL  ";AT 17,11;"ZXCVBNM.£";
TAB 14;"DOWN"
420 IF INKEY$="" THEN GOTO 420
430 GOTO 210
500 RAND
510 LET L=USR 17394
520 LET S=PEEK 16447
530 PRINT AT 23,10;"PRESS A KEY
";AT 23,10;"PRESS A KEY"
540 IF INKEY$="" THEN GOTO 530
550 POKE 16418,2
560 CLS
570 PRINT TAB 11;"GAME OVER";TA
B 11;"---------"
580 PRINT ,,,,"SCORE=";S
590 IF HI>S THEN GOTO 620
600 PRINT ,,,,"A NEW HI-SCORE."
,,"PLEASE INPUT YOUR NAME."
610 INPUT H$
615 LET HI=S
620 PRINT ,,,,"HI-SCORE=";HI;"
BY ";H$
630 PRINT AT 21,10;"PRESS A KEY
"
640 IF INKEY$="" THEN GOTO 640
650 GOTO 5
700 SAVE "OUT"
710 RUN
```

The hex dump.

```
16514 - 0707070707070303 = 48
16522 - 0303030303030303 = 24
16530 - 0303030303030303 = 24
16538 - 0303848484848484 = 798
16546 - 7605858080800000 = 640
16554 - 0000000000028181 = 260
16562 - 8182828201000000 = 520
16570 - 0000000080808005 = 389
16578 - 8576058580808000 = 773
16586 - 0000000000000080 = 128
16594 - 8080808080000000 = 640
16602 - 0000000000808080 = 384
16610 - 0585760585808080 = 778
16618 - 8080808080808080 = 1024
16626 - 808D8D8D8D808080 = 1076
16634 - 8080808080808080 = 1024
16642 - 8005857605858080 = 778
16650 - 8080808080808080 = 1024
16658 - 80808D8D8D8D8080 = 1076
16666 - 8080808080808080 = 1024
16674 - 8080058576058580 = 778
16682 - 8080808080808080 = 1024
16690 - 8080808D8D8D8D80 = 1076
16698 - 8080808080808080 = 1024
16706 - 8080800585760500 = 645
16714 - 0000000000000000 = 0
16722 - 0000000000000000 = 0
16730 - 0000000000000000 = 0
16738 - 0000000000857605 = 256
16746 - 8A8A8A8A8A8A8A8A = 1104
16754 - 8A8A8A8A8A008A8A = 966
16762 - 8A8A8A8A8A8A8A8A = 1104
16770 - 8A8A8A8A8A8A8576 = 1079
16778 - 0500000000000000 = 5
16786 - 0000000000000000 = 0
16794 - 0000000000000000 = 0
16802 - 0000000000000085 = 133
16810 - 76058A8A8A8A8A8A = 951
16818 - 8A8A8A8A8A8A8A8A = 1104
16826 - 8A8A8A008A8A8A8A = 966
16834 - 8A8A8A8A8A8A8A8A = 1104
16842 - 8576050000000000 = 256
16850 - 0000000000000000 = 0
16858 - 0000000000000000 = 0
16866 - 0000000000000000 = 0
16874 - 008576058A8A8A8A = 808
16882 - 8A8A8A8A8A008A8A = 966
16890 - 8A8A8A8A8A8A8A8A = 1104
16898 - 8A8A8A8A8A8A8A8A = 1104
16906 - 8A8A857605000000 = 532
16914 - 0000000000000000 = 0
16922 - 0000000000000000 = 0
16930 - 0000000000000000 = 0
16938 - 00000085760585A8A = 532
16946 - 8A8A8A8A8A8A8A8A = 1104
16954 - 8A8A8A8A8A8A8A8A = 1104
16962 - 8A8A008A8A8A8A8A = 966
16970 - 8A8A8A8A85760500 = 808
16978 - 0000000000000000 = 0
16986 - 0000000000000000 = 0
16994 - 0000000000000000 = 0
17002 - 0000000000857605 = 256
17010 - 8A8A8A8A8A8A008A = 966
```

The hex dump.

```
17018 - 8A8A8A8A8A8A8A8A = 1104
17026 - 8A8A8A8A8A8A8A8A = 1104
17034 - 8A8A8A8A8A8A8576 = 1079
17042 - 0500000000000000 = 5
17050 - 0000000000000000 = 0
17058 - 0000000000000000 = 0
17066 - 0000000000000085 = 133
17074 - 7605000081820000 = 382
17082 - 0000818200000000 = 259
17090 - 0000000000008182 = 259
17098 - 0000000081820000 = 259
17106 - 8576050081808082 = 771
17114 - 0000818080820087 = 650
17122 - 8383830904008180 = 663
17130 - 8082000081808082 = 773
17138 - 0085760585808080 = 773
17146 - 8005858080808005 = 783
17154 - 8500000000058580 = 399
17162 - 8080800585808080 = 906
17170 - 8005857605008480 = 649
17178 - 8007000084808007 = 530
17186 - 0085000000000500 = 138
17194 - 8480800700008480 = 655
17202 - 8007008576050000 = 391
17210 - 8505000000008505 = 276
17218 - 0000850000000005 = 138
17226 - 0000850500000000 = 138
17234 - 8505000085760500 = 394
17242 - 0085050000000085 = 271
17250 - 0500000203030303 = 19
17258 - 0100008505000000 = 139
17266 - 0085050000857682 = 519
17274 - 8383818283838383 = 1045
17282 - 8182838383838383 = 1045
17290 - 8383838381828383 = 1045
17298 - 8383818283838176 = 1030
17306 - FFE90025016D01AF = 817
17314 - 01F1010A014C018E = 473
17322 - 01D0012A3240545D = 543
17330 - 2929192929291922 = 289
17338 - 32407CC9CDAD43E6 = 1114
17346 - 0EFE09F0C69B6F26 = 1019
17354 - 435E23562A0C4019 = 425
17362 - E5061E368A2310FB = 759
17370 - CDAD43E61FFE1DF2 = 1231
17378 - DA435F3E0057E119 = 779
17386 - 77C90B78B120FBC9 = 1112
17394 - 0182402A0C40230A = 358
17402 - FEFF2804770318F6 = 945
17410 - 3E00323C40323D40 = 411
17418 - 323E40323F402A0C = 407
17426 - 4011770219224040 = 389
17434 - 3E0932422402A0C40 = 369
17442 - 1143021922434036 = 330
17450 - B42A40403A4240C6 = 736
17458 - 1C77C3BC443A3D40 = 781
17466 - 3CFE10CCBE43323D = 902
17474 - 403A3F40473E1090 = 542
17482 - 470E00CDEC43CDBB = 985
17490 - 027CFEFCC87D2F6F = 1115
17498 - E681280511210018 = 478
17506 - 1C7DE6182805110F = 692
17514 - FF18127DE6602805 = 793
17522 - 110100180087DE606 = 411
17530 - 282111FFFF2A4340 = 773
17538 - 197EFE00280AFE8D = 850
17546 - 286CFE09287A180B = 608
17554 - 2A43403600193684 = 486
17562 - 2243403A3C40CB47 = 621
17570 - C237442A45403600 = 546
17578 - 237EFE002008368B = 648
17586 - 224540C33744FEB4 = 919
17594 - 2813CDAD43E606C6 = 938
17602 - A56F26435E23562A = 638
17610 - 0C4019180C368B01 = 539
17618 - 0030CDEC4336003A = 668
17626 - 42403DFEFFC83242 = 1016
17634 - 403A3E40CB47CA1F = 755
17642 - 442A4740368D3E00 = 502
17650 - 323E40C31F443A3E = 590
17658 - 40CB47C29D443C32 = 867
17666 - 3E4022474OC39244 = 704
17674 - 3A3E40CB47CA9D44 = 885
17682 - 2A434036001919E5 = 506
17690 - 197EFE00200EE119 = 701
17698 - 36B4010004CDEC43 = 747
17706 - 360018EB11FFFFE1 = 1065
17714 - E5197EFE00200EE1 = 905
17722 - 193684010004CDEC = 705
17730 - 4336001BEBE1E536 = 888
17738 - 8D3A3F403C323F40 = 563
17746 - FE0C2003E100C911 = 744
17754 - 0100E1E5197EFE00 = 860
17762 - 200EE11936B40100 = 531
17770 - 04CDEC43360018EB = 825
17778 - 01DFFFE1E5197EFE = 1338
17786 - 00200EE11936B401 = 531
17794 - 0004CDEC43360018 = 590
17802 - EBE12A454036003E = 751
17810 - 00323E40C31F44 = 470
```

Easy key

Vic20

Andrew Breen,
Paisley.

THIS PROGRAM allows all the keys on the Vic-20's keyboard to be defined except the Shift, CBM logo key and the Restore keys. It gives a sort of one touch entry system as on such machines as the Electron and Spectrum.

Each key can be programmed with up to eight characters, which can be ordinary characters or can be control characters. The figure shows what the keys are currently programmed with: to change them, you will have to program them in order depending on what key by using the values on page 179 on the Programmer's Reference guide, or the table below.

The program takes up 768 bytes of memory and is totally relocatable, so it can be used on any Vic-20. You are asked to enter the Page number of the program. The program has been designed to fit from the start of one page right to the end of the third page. To work out the page number and divide it by 256 and take the whole number part to the result. Make sure that the area of memory is protected from the Basic program and variables by lowering the memory.

Value	Key	Value	Key	Value	Key	Value	Key
0	1	16	none	32	Space	48	Q
1	3	17	A	33	Z	49	E
2	5	18	D	34	C	50	T
3	7	19	G	35	B	51	U
4	9	20	J	36	M	52	O
5	+	21	L	37		53	@
6	£	22	;	38	none	54	
7	DEL	23	⇄	39	f1	55	f5
8	←	24	STOP	40	none	56	2
99	W	25	none	41	S	57	4
10	R	26	X	42	F	58	6
11	Y	27	V	43	H	59	8
12	I·	28	N	44	K	60	0
13	P	29	,	45	:	61	—
14	x	30	/	46	=	62	HOME
15	RETURN	31		47	f3	63	f7

No key gives 64.

Start address is the page number multiplied by 256 plus 75. Therefore use:

Use SYS (page number)x256 + 75

In the data statements, use the left arrow character ('←') to represent return for direct commands, e.g List and Run.

```
READY.
0 REM ****************
1 REM *  CTRL  KEY  *
2 REM *   KEYWORD    *
3 REM *     AND      *
4 REM *  KEY BOARD   *
5 REM *  EXPANSION   *
6 REM *   ROUTINE    *
7 REM *     V.2      *
8 REM *  (C)  1985   *
9 REM *  A.R.BREEN   * 10REM ****
************
10 PRINT"■";
20 INPUT"OHAT ¬AGE";P:D=P*256
30 FORT=0TO85:READM$:GOSUB100:PO
KED+T,M:NEXTT
40 POKED+31,P+1:POKED+58,P+2:POK
ED+81,P
50 FORF=0TO63:READS$:R$=CHR$(0):
S$=S$+R$+R$+R$+R$+R$+R$+R$+R$
60 FORT=1TO8:A=ASC(MID$(S$,T,1))
:IFA=95THENA=13
70 POKED+255+F*8+T,A
80 NEXTT,F
99 END
100 H=ASC(LEFT$(M$,1)):H1=(H-48)
*16:IFH>57THENH1=(H-55)*16
110 H=ASC(RIGHT$(M$,1)):H2=(H-48
):IFH>57THENH2=(H-55)
120 M=H1+H2
130 RETURN
200 DATA AD,8D,02,29,04,F0,28,A5
,C5,C5,FB,F0,22,C9,40
210 DATA F0,1E,85,FB,C9,20,10,1B
,0A,0A,0A,AA,A0,00,BD
220 DATA 00,FF,C9,00,F0,09,99,77
,02,C8,E8,C0,08,D0,F0
230 DATA 84,C6,4C,BF,EA,0A,0A,0A
,AA,A0,00,BD,00,FF,C9
240 DATA 00,F0,EE,99,77,02,C8,E8
,C0,08,D0,F0,18,90,E2
250 DATA A9,00,8D,14,03,A9,FF,8D
,15,03,60
300 DATA "","","","",""
310 DATA "■","■",?FRE(0)←,SYS,OP
EN
320 DATA "",RESTORE←,RUN,GOSUB,C
ONT←
330 DATA RETURN←,"",PEEK,END←,NE
XT
340 DATA READ,SPC(,CHR$,INPUT#,R
UN←
350 DATA "",LIST,VERIFY←,STEP,ST
OP,PRINT,INPUT
360 DATA "",LIST←,LOAD,THEN,TO
370 DATA PRINT#,"",?TIME$←,"",SA
VE
380 DATA FOR,DATA,TAB(,ASC,IF
390 DATA ?STATUS←,POKE,CLOSE,CLR
←,REM
400 DATA GET,GOTO,WAIT,GET#,""
410 DATA "","","","","■","■",CMD

420 REM **************
421 REM *START ADD.=*
422 REM *PAGE*256+75*
423 REM *  TO STOP   *
424 REM * RUN  STOP  *
425 REM *    AND     *
426 REM *  RESTORE   *
427 REM **************
READY.
```

Screen Dump

Spectrum

L W Tomlin,
New Southgate,
London.

THE IMPLEMENTATION of RS-232 on Interface 1 is fairly good, for printers at least, but it can be quite a tricky business to transfer the screen to it. The machine-code routine here will do this by adding two new commands.

First of all type the numbers in the hex dump into the hex-loader provided, stopping with "*".

Then save the code with

SAVE *"M";1;"copycode" CODE 32768,213

That done enter

OPEN# 3;"B":FORMAT "B",x

where x is the correct baud rate for your printer. Now enter

RANDOMIZE USR 32768

and you have two new commands at your disposal.

The first one is Copy $ which will send a compacted picture of the screen to the printer. The second Copy # gives a picture twice this size and is ideal for cassette covers, etc. The routine is fully relocatable so if you loaded the code to 40000 then type

(continued on next page)

(continued from previous page)

RANDOMIZE USR 40000

to set up the new commands. The routine must not go into the printer buffer as it uses this itself.

The routine works with any printer that uses Epson-type control codes such as the cheap Brother range. Make sure that the "B" channel has been opened before calling the code. It can take quite a while to print the screen at the lower baud rates but only takes about a minute at higher speeds.

The hex loader.

```
  10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2
)-48-(7 AND h$(2)>"9")
  20 INPUT "Start ";s
  30 INPUT "Finish ";f
  40 FOR n=s TO f STEP 8
  50 LET tot=0: PRINT n;": ";
  60 INPUT h$: PRINT h$;
  70 LET x=0
  80 FOR b=1 TO LEN h$ STEP 2
  90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ";: INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
 error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

Header program.

```
   5 OPEN #3,"b": FORMAT "b",960
0
  10 CLEAR 32767
  20 LOAD ""CODE 32768
  30 RANDOMIZE USR 32768
  40 CLS
  50 PRINT ''''           'COPY $' and
 'COPY #'''''           are now avai
lable"
```

Hex dump.

```
32768:  210C0009E5CF31E1  =  764
32776:  22B75CC9FE31C2F0  =  1247
32784:  013E4B32B05CD720  =  703
32792:  00FE23280AFE24C2  =  823
32800:  F0013E4C32B05CD7  =  912
32808:  2000CDB7053E03D7  =  705
32816:  01163E1BD710003E  =  405
32824:  41D710003E04D710  =  593
32832:  003E0DD710003E0A  =  378
32840:  D710000600E00DD   =  472
32848:  21005B79CB3F6F78  =  742
32856:  E6300F6778E60E07  =  767
32864:  070707B56F78E601  =  664
32872:  0707B4F64067C506  =  810
32880:  08E516003E084E58  =  495
32888:  CB391D20FBCB1224  =  829
32896:  3D20F37ADD7700DD  =  1019
32904:  23E110E5C10C0C79  =  843
32912:  FE4038BFC53E1BD7  =  1066
32920:  10003AB05CD71000  =  573
32928:  AFD710003E01D710  =  700
32936:  0021005B06007ED7  =  471
32944:  10002310F93E0DD7  =  606
32952:  10003E0AD71000C1  =  512
32960:  040478FE3038863E  =  682
32968:  1BD710003E32D710  =  601
32976:  00C3C10500000000  =  393
```

Key Helper

Colin Newcombe, Sudbury, Suffolk.

THIS PROGRAM defines most of the keys, A-Z, to print whole Basic keywords without affecting the numeric keypad. The program uses less than 1K of memory.

In the CPC-464 User Guide, there is a paragraph of key defining which tells you very briefly about the numeric keypad which can be used as function keys — this makes 12 function keys, key numbers from 128-139.

The other 20 function keys are not mentioned and are left out of the user guide. The program which I have written uses these 20 and leaves the numeric keypad alone so it can be used as normal because many people use the keypad for entering Data than using the normal top row number keys.

I have made it as easy as possible to remember which key prints which keyword. The keywords are called by pressing Control and a Key:

A = AFTER	L = LOCATE
B = BORDER	M = MODE
C = CHR$(	N = NEXT
D = DATA	P = PRINT
E = ELSE	R = RETURN
F = FOR	S = SYMBOL
G = GOSUB	T = THEN
H = HEX$(	U = UPPER$
I = INKEY$	V = VAL(
K = KEY	W = WHILE

As you can see, it is very easy to remember which keywords each key prints. If this sounds complicated then I suggest you sell your micro! I have tried to use the most commonly used keywords. All of the keys can be reset to normal by:

CAL &BB00

Using this very short program you can speed up programming and make typing in listings easier and much quicker. ■

```
100 REM *****************
110 REM *** Key Helper ***
120 REM * Colin Newcombe *
130 REM ***** 3-6-85 *****
140 REM * Software File. *
150 REM *****************
160 REM
170 REM - Loop to define KEYS -
180 REM
190 FOR big.key%=140 TO 159
200  READ message$,letter$,key.number%
210  lower%=ASC(LOWER$(letter$))
220  upper%=ASC(UPPER$(letter$))
230  KEY DEF key.number%,1,lower%,upper%,big.key%
240  KEY big.key%,message$
250 NEXT big.key%
260 REM
270 REM - DATA for key defining -
280 REM
290 DATA "AFTER ",A,69,"BORDER ",B,54
300 DATA "CHR$(",C,62,"DATA ",D,61
310 DATA "ELSE ",E,58,"FOR ",F,53
320 DATA "GOSUB ",G,52,"HEX$(",H,44
330 DATA "INKEY$",I,35
340 DATA "KEY ",K,37,"LOCATE ",L,36
350 DATA "MODE ",M,38,"NEXT",N,46
360 DATA "PRINT ",P,27
370 DATA "RETURN",R,50,"SYMBOL ",S,60
380 DATA "THEN",T,51,"UPPER$",U,42
390 DATA "VAL(",V,55,"WHILE ",W,59
```

YOUR COMPUTER CLASSIFIED

01-661 3036

Contact: Susan Platts

ADVERTISEMENT RATES — Copy Date July 29th

RATES QUOTED BELOW ARE SUBJECT TO THE ADDITION OF 15% VAT.

Linage: 60p per word (Min 20 words)
Box No: £7.00 extra
Linage advertisements are prepayable and the order form published in this section should be completed and returned with remittance. Credit Card facilities are available.

Display — rates per scc (Min. 2scc)

One insertion	:	£10.00
Three insertions	:	£9.70
Six insertions	:	£9.50
Twelve insertions	:	£9.00

Display advertisers should preferably reserve space by phone.

Closing date for Classified advertisements is the 29th July for the September issue.

Post to
Your Computer, Classified Department, Room H211, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Britain's Biggest Selling Home Computer Magazine

FREE MEMBERSHIP SOFTWARE HIRE

• VIC-20 • COMMODORE 64 • • SPECTRUM •

SAE FOR YOUR HIRE KIT

VSH (YC), PO BOX 65, NOTTINGHAM NG1.

PLEASE STATE MICRO

COMPUTER REPAIR CENTRE
Have you got problems with your computer?
THEN CALL US
BBC, Spectrum, CBM, Dragon
Mail order or call in
ENFIELD COMMUNICATIONS LTD
135 High St, Ponders End, Enfield, Middx.
01-805 7772

BLANK CASSETTES

WITH LIBRARY CASES

	C10	C15	C20	C30
10	3.65	3.85	4.00	4.00
50	14.00	14.15	14.30	14.30
100	25.00	26.00	27.00	27.00

Fully inclusive (COD 65p extra)
Superior Tapes. Don't Settle for Less!

• • •

5¼" DS/DD DISKS

10 for £13.00 fully inc.
10 for £13.50 inc. Plastic Case

• • •

RING US NOW! (0793) 695034
UK HOME COMPUTERS (Dept YC)
82 CHURCHWARD AVE,
SWINDON, WILTS SN2 1NH

SUPER POWER

ROM SOFTWARE FOR THE AMSTRAD CPC 464
FULFILS THE PROMISE OF YOUR AMSTRAD

SUPERPOWER ROM-CARD
–7 Sockets for 8K or 16K eproms (external cased unit with bus extension) £39.95.

SUPERPOWER ROM-BASED SOFTWARE
Disk User's Utilities • Mailing List/Club Membership • Programmer's Toolbox • Assembler/Disassembler/MC Code Monitor • All £39.95 each.

Word Processor, Database, Spreadsheet, Graphics/Statistics – With Data Interchange. Prices to be announced. Available Aug./Sept.

Order today. Phone 0532 434006 or by mail order from MicroPower Ltd., Sheepscar House, Sheepscar Street South, Leeds LS7 1AD. P&P 95p. Access/Visa.

WDSoftware

FOR THE QL

WD Utilities (3rd ed) (base £5.50)
PRINT 60-file DIRectory or view it on one screen, one-key LOAD, COPY or PRINT 60 files with one key (allows for namesakes). Multiple FORMATing to prevent corruption by stretching of tape. TOOLkit to give dated, numbered modules in program development. PRUNE old files to release space (one key DELETEs a file). Full instructions in QUILL file. Use up to 6 EXTRA MICRODRIVES (add on your Spectrum ones)!

WD Utilities for CST Q-Discs (base £8)
100-file capacity, for CST/Computamate disc systems AND up to 4 extra microdrives. User-friendly timesavers.

RefQL (3rd ed) (base £3)
500 useful QL references in an ARCHIVE file (too long for one cartridge with Utilities and Morse).

FOR SPECTRUM/QL/BBC

WD Morse Tutor (base £4)
From absolute beginnewr to beyond RYA and Amateur Radio receiving. Adjust pitch. Set speed to your test level (4-18 wpm). Learn from single characters, via groups with wide spaces to random sentences; decrease spacing to normal. Write down what you hear, then CHECK on Screen or Printer (or speech for Spectrum with Currah Microspeech). Also own message, random figures, letters or mixed.

FOR SPECTRUM 48K

Tradewind (base £4)
Sailing/trading strategy game with graphic surprises.

Jersey Quest (base £4)
Text adventure with Bergerac and the Dragon. (not disc)

PRICES (incl Europe postage — elsewhere add £1)
Spectrum/BBC Cassettes — base price only
QL or Spectrum Microdrives — £2/cartridge plus base price
5.25" floppies £2 plus base (SPDOS format for Spectrum)

Two or more programs on one medium — pay medium + base. E.g. WD Utilities and RefQL for £10.00, but IMPOSSIBLE to mix QL/BBC/Spectrum programs on one medium. Send YOUR cartridge and base price, but FORMAT it FIRST in your DRIVE 1 for compatibility.

WDSoftware (YC), Hilltop, St Mary, Jersey. Tel. (0534) 81392

NOTICE TO ADVERTISERS
VALUE ADDED TAX

Would classified advertiser's please note that 15% Value Added Tax must be added to advertisement rates quoted in this Journal.

WHY NOT
let your microcomputer earn you money? Your hobby can provide the key to a fabulous income, full or part time. Expert manual explains how you can use your microcomputer to set up your own business from home with little capital. Send today for your copy of "Make Money with your Microcomputer" £10 incl. p&p (U.K. only) or for free details to:

Enterprise Books (YC)
12 Felstead Road, Waltham Cross, Herts. EN8 7HB.
Money back if not satisfied.

- MAXAM -
FOR THE AMSTRAD

THE COMPLETE CODE DEVELOPMENT SYSTEM FOR THE AMSTRAD CPC 464.
★ ASSEMBLER ★ MONITOR ★ TEXT EDITOR ★

"The Arnor system is the best editor/assembler to be released for the AMSTAD so far" - PCN 100
"For flexibility and ease of use, ARNOR is easily the best I have seen" Pop. C. Wkly Vol 4 No 8
"assemblers.... look no further, ARNOR's is the best I have seen... by far the easiest to use and most friendly I have come across"
- Computing with the Amstrad. April 1985.

Now available in **ALL THREE** formats

Tape (only) £13.50

Disc £26.90.

16K ROM + multifunction adaptor £59.90

(All prices include VAT, p & p)

Cheques/POs to ARNOR Ltd Dept YC
PO Box 619, London SE25 6JL

-Overseas - no extra - Trade enq's welcome -

Make MAXimum use of your AMstrad

Hotline 01.653.1483 **Technical 01.852.2174**

FLOPPY DISKS

BULK PURCHASE FOR MAXIMUM DISCOUNTS

AN UNCONDITIONAL GUARANTEE

If you are disatisfied with the disks they will be replaced or full credit given whichever you prefer.

The disks are certified 100% error free and carry a 10 million pass warranty without disk related errors or significant wear.

PRICES 5¼" disks (inclusive of VAT post and packaging). Orders under 10 units add another 20% of the prices shown.

TYPES	RRP	DISCOUNT PRICES/DISK
SSSD 48 TPI	£2.77	£1.08
SSSD 48 TPI	£2.97	£1.15
DSDD 48 TPI	£4.25	£1.27
SSDD 96 TPI	£4.79	£1.45
DSDD 96 TPI	£4.95	£1.54

Terms: Payment with order.
T.J. SERVICES CO.,
Roach House, 3 Beltona Gardens, Cheshunt Herts. EN8 0PA.
Tel: 0992 20365

ORIC 1 & ORIC ATMOS SOFTWARE
OVER 100 TITLES AVAILABLE

ALL AT DISCOUNT PRICES e.g. (All ATMOS compatible)
£4.50 Krylla, Oric Munch, Super Advanced Breakout £4.95 Arena 3000, Kilburn Encounter, Skramble, Show Jumping, £5.50 Cribbage, Frigate Commander, Super Fruit, £5.95 Chess II, Digger, Defence Force, Draculas Revenge, Elektrostorm, Galaxians, Harrier Attack, Hellion, Land of Illusion, Ice Giant, M.A.R.C. Mr Wimpy, Panic, Rat Splat, Scuba Dive, Spooky Mansion, Super Meteors, Trouble In Store, Ultima Zone, £6.50 Attack Cyberman, Backgammon, Draughts, Ghost Gobbler, Invaders, Probe 3, Trickshot, Zebbie, Zoolympics, £6.95 Categoric, Classic Racing, Manic Miner, Space Shuttle, World Geography, 4 Games Children, £7.50 Dambuster, Diabolical Tower, Fireflash, Don't Press Letter Q, Styx, Trans At 1, Xenon 1, Zorgons Revenge, £11.50 Author, Oric Calc, Oric Mon, Dust Covers £2.95 On Off Reset Switch £4.50

ATMOS MCP 40 PRINTER £79.95
incl. cable
CH/PO's to O.J. SOFTWARE
(Prices incl U.K. p&p)
273 Mossy Lea Rd, Wrightington
Wigan, Lancs. WN6 9RN.
Tel. (0257) 421915
Overseas Please Add 50p Europe £1
Others per item
Write or Phone for FREE List

COMPETENT person required to write, control and graphics program for science education 380Z Apple or BBC. Indicate experience. Box No. 734. 734

HOME ACCOUNTS. Put your house in order! Probably the best home use for your computer! Comprehensive coverage of bank accounts, credit cards, HP, etc. Inbuilt accuracy check for all transactions. Project cashflow for any period ahead. Available for CBM 64 or VIC-20 £8.45 or free details from: DISCUS SOFTWARE, FREEPOST, Windmill Hill, Brixham TQ5 9BR. Tel: 08045 55532. 477

NOTICE TO ADVERTISERS

In view of legislation which may shortly be introduced, 'Your Computer' will not publish advertising for copiers or other equipment which may encourage copyright theft.

AMSTRAD 464

BINARY BANANA

MAGIC PEN
Fill or sketch and save to file.
Loaders allow position anywhere on screen, even half on. Loaders included £4.95

SYMBOL 464
Re-design your character set the easy way save to tape and/or Binary readout £3.95

BIG LETTERS
Can produce very large letters, pictures etc., with symbol 464 or standard a.s.c.I.I. character set. Loader program included £3.95.

LITTLE LETTERS
Ten to a file 9 colours in a sixteen by sixteen pixcel letter or small picture, than enlarge X2-X4 loader programs supplied £3.50

THE ARTIST
Over 20 functions plus airbrush and Binary screen dump to tape. Includes text for titles etc. loader loads on screen while cassette runs £4.95.

DETAILS
Add a disk facility to your cassette system with this unique program. Now you can use C-60's or 90's. How did you ever manage without it? £2.95

Trade & export enquiries welcome.

Binary Banana c/o Pi Tec Ltd.
Park Crescent, Peterborough PE1 4BG.

BLANK DISKS

SJB SUPER SAVERS

5¼" blank disk
(bulk packed by memorex)

10 single side/double density
£12.95
including free plastic case

10 double side/double density
£16.95
including free plastic case

50 ss/dd in a perspex storage box
£59.95

50 ss/dd in a perspex storage box
£79.95

All prices include VAT
p&p is free in UK

Please send cheques/PO to:

SJB DISK SUPPLIES
(Dept YCO)
11 Oundle Drive
Wollaton Park
Nottingham
NG8 1BN
Tel: (0602) 782310

HELP needed in packaging and mailing hardware and software overseas. Please write to Corso Serra Barrio Sanatorio, Nueva Helvecia, Uruguay. 702

ASTROLOGY for beginners only £11.50

A Starter Pack comprising a simple program to calculate a horoscope, an introductory booklet & 2 self-teaching programs (how to interpret the horoscope).

No previous knowledge required

Spectrum, BBC/Electron, Oric, Dragon, Tandy/Genie, Commodore 64/PET, Atari Sharp, Amstrad/Schneider, Colour Genie.

Many more programs for experienced astrologers also other micros, CP/M and MSDOS

Deze programmas zijn thans in Nederlandstalige versies verkrijgbaar voor Spectrum & Commodore 64. Vraag Documentatie!

Cash with order (add 50p outside UK) or large sae for free catalogue to:

ASTROCALC
(Dept YC)
67 Peascroft Road,
Hemel Hempstead,
Herts. HP3 8ER.
Tel: 0442 51809

LEVEL 9 ADVENTURES
for 32K or bigger versions of AMSTRAD BBC SPECTRUM CBM64 MSX ENTERPRISE MEMOTECH ATARI

Colossal Adventure, Adventure Quest, Dungeon Adventure, Snowball, Return to Eden, Lords of Time. All text adventures £9.95 cassette or (£11.95 disk BBC & CBM only) Also Emerald Isle— graphic adventure £6.95 cassette or (£8.95 disc BBC & CBM only)

QUAZAR COMPUTING
29 Western Road,
Newick, E. Sussex BN8 4LE.

SPECTRUM MACHINE CODE SYSTEM

ASSEMBLER, DIS-ASSEMBLER, TESTER/DEBUGGER, ON-LINE LEARNING AID with teach yourself machine code booklet.

Options include using microdrive, printer, hex or decimal numbers

"A different approach giving a highly usable package . . . the most impressive part is the test/debug features . . . invaluable guide to the secrets of the Z80 (Spectrum CPU)" — PC Today July 85

"It seems to have absolutely everything you could possibly want for machine code . . . much care is taken in the manual in making the code as Basic-like as possible." — PC Weekly 21 Mar 85

Cassette £7.95, Microdrive Cartridge £9.75, Overseas + £1

Orders with PO/cheque to ROYBOT, Dept. YC4, 45 Hullbridge Road, Rayleigh, Essex SS6 9NL. Write or tel: 0268 771663 for leaflets.

IMPROVE YOUR PROSPECTS

with skills that employers want — learn the easy way with modern home study courses from Ideal Schools.

MODERN ELECTRONICS
Train for success in the fastest ever growing industrial sector.

COMPUTER PROGRAMMING
The demand for Programmers is increasing constantly — don't miss out!
For free booklet write today to

IDEAL

IDEAL SCHOOLS
(Ref. YC12)
60 St. Enoch Sq
Glasgow G1 UK.
Tel: 041-248 5200

"BATTLEFRONT", the ULTIMATE EPIC IN WAR STRATEGY GAMES for the CP 464. Covers all modern conventional warfare. Includes fighters, bombers, paratroops, tanks, artillery, scouts, ground to air missiles and the ability to select forces and change scenarios. Only £8.95 Cheques/P.O. to **Z. Karim Software, 60 Helena Road, London E13 0DU.**

The Publishers take all reasonable care to ensure that classified advertisements are genuine, but readers must satisfy themselves that they will be obtaining what they require before entering into transactions, particularly if they involve large sums of money. 128/128

LETTA-HEAD
for the 48k Spectrum

An ENTIRELY ORIGINAL utility program to design and print your own business letter-heads, orders, receipts, personal stationery, labels and posters.

* 5 different type faces
* Proportional spacing
* Variable character width & height
* Block scroll, inverse & erase
* Variable thickness box function
* Graphics mode for your logo design
* Special cassette label option
* Many more features!

Drives Epson type printers (inc. Star, M-T, Shinwa etc.) via most interfaces (IF1, Hilderbay, Kempston, Kempston E, Tasman, Morex, Wafadrive).

Price: £7.50 on cassette, £9.50 on cartridge, or SAE further details & additional interface compatibility from:

Bradway Software (YC),
33 Conalan Ave., Sheffield
S. Yorks, S17 4PG.

SELL IT WITH YOUR COMPUTER

CLASSIFIED ORDER FORM

Classified Rates

Linage: 60p per word (Min 20 words) — prepayable

Linage advertisers should complete the form provided in BLOCK CAPITALS. Phone number counts as 2 words. Name and address to be paid for if used in advertisement. Box Number if required is £7.00 extra.

Display — rates per scc (Min 2scc)

One insertion	:	£10.00
Three insertions	:	£9.70
Six insertions	:	£9.50
Twelve insertions	:	£9.00

Display advertisers should provide separate copy and preferably reserve space by phone (01-661 3036).

Method of Payment

Cheques etc, should be made payable to Business Press International Ltd, and crossed. I enclose herewith cheque/PO for

£ . . . .

Please debit my Access/Visa Barclay Card/American Express/Diners Club Int/ /as below

SIGNATURE

Post to:
Cut out the order form and return together with your remittance to: Classified Department, Your Computer, Room H211, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. (01) 661 3036

Please insert the following advertisement in Your Computer Classified Section

					LINAGE	PLUS 15% VAT	TOTAL
					£12.00	£1.80	£13.80
					£15.00	£2.25	£17.25
					£18.00	£2.70	£20.70
					£21.00	£3.15	£24.15
					£24.00	£3.60	£27.60
					£27.00	£4.05	£31.05
					£30.00	£4.50	£34.50

No. of insertions required ☐ Box No. required YES/NO

NAME *(Please include initials)* . . . .

ADDRESS . . . .

Payment by credit card please state address card is registered

Daytime tel. no . . . .

THIS FORM SHOULD BE RETURNED BY JULY 29 FOR THE SEPTEMBER ISSUE

Company Registered Number: 151537 (England) Registered Office: Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Hot★ lines

Acorn Computers
Telephone: Cambridge 0223 210111

Atari
Telephone: Slough 0753 24561

Amstrad
Telephone: Brentwood 0277 228888

Commodore CBM
Telephone: Northampton 0536 205252

Enterprise
Telephone: 01-739 4282

Sinclair
Telephone: Camberley 0276 685311

Tandy Corporation
Telephone: Birmingham 021 5566101 ext 33

Toshiba
Telephone: Camberley 0276 62222

DATEBASE

Local, national and international micro events are updated here.

Making Music

Be warned, some days are trade only so check with the organisers before you wander in and check out all the new chip and computer-assisted ways of making music.

The event more properly known as the British Music Fair takes place from July 30-August 4 (first three days trade only) at Olympia 2. Organised by Philbeach Events, London. Telephone 01-385 1200.

Info North

The Information Technology and Office Automation Exhibition takes place at Belle Vue, Manchester from September 17 to September 19. Open to the general public, more details available from BED Exhibitions, 44 Wallington Square, Wallington, Surrey. Telephone 01-647 1001.



In line with defence cuts, Sinclair Spectrums (bought from the warehouses of old microcomputer distributors which have gone bust) are now controlling Britain's first-strike capability. Not entirely true, as the picture above shows Westland hleicopters supremo Dr Jones demonstrating a special presentation version of Durell software's Combat Lynx to Major General Goodman of the Army Air Corps.

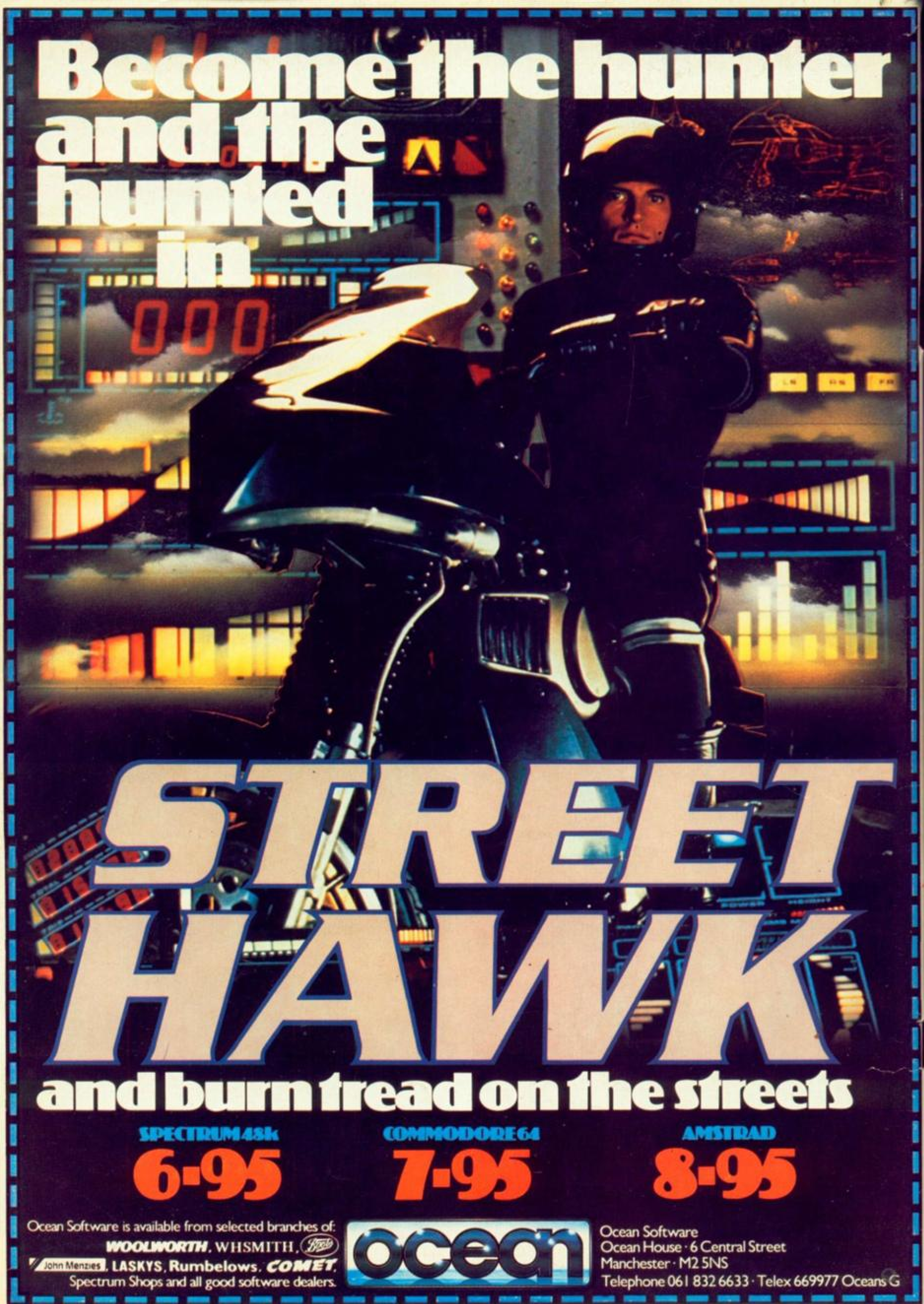
BBC Micro User Show

UMIST, The University of Manchester Institute of Science and Technology hosts the BBC MIcro User Show from September 27-29. £2 to get in if an adult, £1.50 for non-adults. Telephone Database Publications, Stockport for more details: 062 429 8080.

INDEX OF ADVERTISERS



THE FUTURE OF MANKIND IS IN YOUR HANDS!
DROPZONE
It's the year 2085. Only a handful of people have survived the robot wars that rocked the Solar System. In a final desperate bid for survival a Tacheon propelled star cruiser has been developed on Earth to transport survivors to new star system. But the cruiser relies on rare Ionian crystals for its power; crystals which are only abundant on Jupiter's second moon Io. A moonbase established on Io is under constant attack by aliens from Jupiter. It is your mission to escort the men and their precious crystals safely from the surface of Io to the Dropzone where the landing pad is located. You are equipped with the latest pulse-laser back-pack system which will make you invisible and indestructible for short periods of time. You must succeed, the future of the human race depends on you alone!
64
ATARI
Super smooth scrolling screen
High resolution graphics
Nine different alien attackers
Scrolling high speed scanning viewer
Exploding volcanoes
Ultra fast action
Cassette £9.95
Disk £14.95
U.S. GOLD
All American Software
U.S. GOLD Ltd., Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY.
Telephone: 021-359 3020. Telex: 337268.



Become the hunter and the hunted in
STREET HAWK
and burn tread on the streets
SPECTRUM 48k
6·95
COMMODORE 64
7·95
AMSTRAD
8·95
Ocean Software is available from selected branches of:
WOOLWORTH, WHSMITH, Boots
John Menzies, LASKYS, Rumbelows, COMET,
Spectrum Shops and all good software dealers.
ocean
Ocean Software
Ocean House · 6 Central Street
Manchester · M2 5NS
Telephone 061 832 6633 · Telex 669977 Oceans G